From Eye to Insight

Leica
MICROSYSTEMS

MEDICAL DIVISION

ARveo

User Manual

10 747 384 - Version 04

CE

Thank you for purchasing a Leica surgical microscope system.
In developing our systems, we have placed great emphasis on simple, self-explanatory operation. Nevertheless, we suggest studying this user manual in detail in order to utilize all the benefits of your new surgical microscope.
For valuable information about Leica Microsystems products and services, and the address of your nearest Leica representative, please visit our website:

www.leica-microsystems.com

Thank you for choosing our products. We hope that you will enjoy the quality and performance of your Leica Microsystems surgical microscope.

Leica Microsystems (Schweiz) AG Medical Division
Max-Schmidheiny-Strasse 201 CH-9435 Heerbrugg
Tel.: +41 71 726 3333

Legal disclaimer
All specifications are subject to change without notice.
The information provided by this manual is directly related to the operation of the equipment. Medical decision remains the responsibility of the clinician.
Leica Microsystems has made every effort to provide a complete and clear user manual highlighting the key areas of product use. Should additional information regarding the use of the product be required, please contact your local Leica representative.
You should never use a medical product of Leica Microsystems without the full understanding of the use and the performance of the product.

Liability
For our liability, please see our standard sales terms and conditions. Nothing in this disclaimer will limit any of our liabilities in any way that is not permitted under applicable law, or exclude any of our liabilities that may not be excluded under applicable law.

Contents

1 Introduction

1.1 About this user manual

In this user manual the surgical microscope ARveo is described.

In addition to notes on the use of the instruments this user manual gives important safety information (see chapter "Safety notes").

- ▶ Read this user manual carefully before operating the product.

1.2 Symbols in this user manual

The symbols used in this user manual have the following meaning:

Symbol	Warning word	Meaning
⚠	**Warning**	Indicates a potentially hazardous situation or improper use that could result in serious personal injuries or death.
⚠	**Caution**	Indicates a potentially hazardous situation or improper use which, if not avoided, may result in minor or moderate injury.
	Note	Indicates a potentially hazardous situation or improper use which, if not avoided, may result in appreciable material, financial and environmental damage.
!		Information about use that helps the user to employ the product in a technically correct and efficient way.
▶		Action required; this symbol indicates that you need to perform a specific action or series of actions.
MD		Medical Device

1.3 Optional product features

Different product features and accessories are optionally available. The availability varies from country to country and is subject to local regulatory requirements. Please contact your local representative for availability.

2 Product identification

The model and serial numbers of your product are located on the identification label on the illumination unit.

- ▶ Enter this data in your user manual and always refer to it when you contact us or the service workshop regarding any questions you may have.

Type	Serial no.
...	...

3 Safety notes

The ARveo surgical microscope is state-of-the-art technology. Nevertheless, hazards can arise during operation.

► Always follow the instructions in this user manual, and in particular the safety notes.

3.1 Intended use

- The ARveo surgical microscope is an optical instrument for improving the visibility of objects through magnification and illumination. It can be applied for observation and documentation and for human medical treatment.
- The ARveo surgical microscope may be used only in closed rooms and must be placed on a solid floor.
- The ARveo surgical microscope is subject to special precautionary measures for electromagnetic compatibility. It must be installed and commissioned in accordance with the guidelines and manufacturer's declarations and recommended safety distances (according to EMC tables based on EN60601-1-2: 2015).
- Portable and mobile as well as stationary RF communications equipment can have a negative effect on the reliability of the ARveo surgical microscope's functionality.
- The ARveo is intended for professional use only.
- The essential performance of the ARveo is to provide illumination and mechanical stability of the optics carrier in any position.

WARNING

Danger of injury to the eyes.

► Do not use the ARveo in ophthalmology.

3.2 Directions for the person responsible for the instrument

► Ensure that the ARveo surgical microscope is used only by persons qualified to do so.

► Ensure that this user manual is always available at the place where the ARveo surgical microscope is in use.

► Carry out regular inspections to make certain that the authorized users are adhering to safety requirements.

► When instructing new users, do so thoroughly and explain the meanings of the warning signs and messages.

► Allocate responsibilities for commissioning, operation and maintenance. Monitor compliance with this.

► Only use the ARveo surgical microscope when it is free of defects.

► Inform your Leica representative or Leica Microsystems (Schweiz) AG, Medical Division, 9435 Heerbrugg, Switzerland, immediately about any product defect that could potentially cause injury or harm.

► If you use accessories from other manufacturers with the ARveo surgical microscope, make sure that these manufacturers confirm that the combination is safe to use. Follow the instructions in the user manual for those accessories.

- Modifications to or service on the ARveo surgical microscope may be carried out only by technicians who are explicitly authorized by Leica to do so.
- Only original Leica replacement parts may be used in servicing the product.
- After service work or technical modifications, the device must be readjusted in accordance with our technical specifications.
- If the instrument is modified or serviced by unauthorized persons, is improperly maintained (as long as maintenance was not carried out by us), or is handled improperly, Leica Microsystems will not accept any liability.
- The effect of the surgical microscope on other instruments has been tested as specified in EN 60601-1-2. The system passed the emission and immunity test. Comply with the usual precautionary and safety measures relating to electromagnetic and other forms of radiation
- The electric installation in the building must conform to the national standard, e.g., current-operated ground leakage protection (fault-current protection) is suggested.
- Like any other instrument in the operating theater, this system may fail. Leica Microsystem (Schweiz) AG therefore recommends that a backup system is kept available during the operation.

3.3 Directions for the operator of the instrument

► Follow the instructions described here.

► Follow the instructions given by your employer regarding the organization of work and safety at work.

3.4 Dangers of use

WARNING

Danger of injury to the eyes.

- ► Do not use the ARveo in ophthalmology.

WARNING

Danger of injury due to:

- **uncontrolled lateral movement of the arm system,**
- **tilting of the stand,**
- **trapping of feet in lightweight shoes beneath the casing of the base.**

- ► For transportation, always move the ARveo surgical microscope into the transport position.
- ► Never move the stand while the unit is extended.
- ► Never roll the stand or OP equipment over the cables lying on the floor.
- ► Always push the ARveo surgical microscope; never pull it.

WARNING

Risk of injury due to downward movement of the surgical microscope.

- ► Complete all preparations and adjustments to the stand before the operation.
- ► Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
- ► Balance the ARveo after re-equipping it.
- ► Do not release the brakes when the instrument is in an unbalanced state.
- ► Before re-equipping during the operation, first swing the microscope away from the operating field.
- ► Never carry out the intraoperative AC/BC balancing above the patient.

WARNING

Danger of injury due to movement of the microscope during the balancing process.

- ► Do not sit or stand immediately next to the microscope during the balancing process.

WARNING

Danger of injury to the eyes due to possibly hazardous optical infrared and UV radiation.

- ► Do not look at the operating lamp.
- ► Minimize exposure to eyes or skin.
- ► Use appropriate shielding.

WARNING

Danger of burn injuries in otologic surgery.

- ► Use the lowest comfortable light intensity.
- ► Adjust the field of view to match the operating field.
- ► Irrigate the wound frequently.
- ► Cover the exposed parts of the pinna with a moist surgical sponge.

WARNING

Risk of infection.

- ► Always use the ARveo surgical with sterile controls and a sterile drape.

WARNING

Danger of fatal electrical shock.

- ► The ARveo surgical microscope may be connected to a grounded socket only.
- ► Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

WARNING

Danger of injury to the eyes.
At a short focal distance, the light source of the illumination unit may possibly be too bright for the operating physician and the patient.

- ► Begin with the lower-intensity light source and slowly increase it until the operating physician has an optimally illuminated image.

WARNING

Danger to the patient due to failure of the magnification or working distance motor.

- ► If the magnification motor fails, adjust the magnification manually.
- ► If the working distance motor fails, adjust the working distance manually.

WARNING

Danger of serious damage to tissue due to incorrect working distance.

- ► When using lasers, always set the working distance of the microscope to laser distance and lock the microscope in position.
- ► Do not adjust the rotary button for manual setting of the working distance while using the laser.

WARNING

Danger of injury to the eyes due to laser radiation.

- ▶ Never point the laser directly or indirectly via reflecting surfaces to the eyes.
- ▶ Never point the laser to the eyes of the patient.
- ▶ Do not look into the laser beam.

CAUTION

Surgical microscope can move without warning.

- ▶ Always lock the footbrake when you are not moving the system.

CAUTION

Danger of injury due to falling weight disk or cover.

- ▶ When changing the weight disk, make sure that your feet are not beneath the weight disk or the cover.

CAUTION

Danger of injury due to falling counterweights.

- ▶ Before attaching the sterile drape, check the counterweights for correct seating.

CAUTION

Risk of infection.

- ▶ Leave sufficient space around the stand to ensure that the sterile drape does not come into contact with non-sterile components.

CAUTION

Hot lamp insert can cause burns.

- ▶ Do not touch the hot lamp insert.

CAUTION

If the field diameter is greater than the field of view and the light intensity is too high, uncontrolled tissue heating may occur outside of the area visible through the microscope.

- ▶ Do not set the light intensity too high.

CAUTION

Danger to the patient due to changes in the user settings.

- ▶ Never change the configuration settings or edit the user list during an operation.

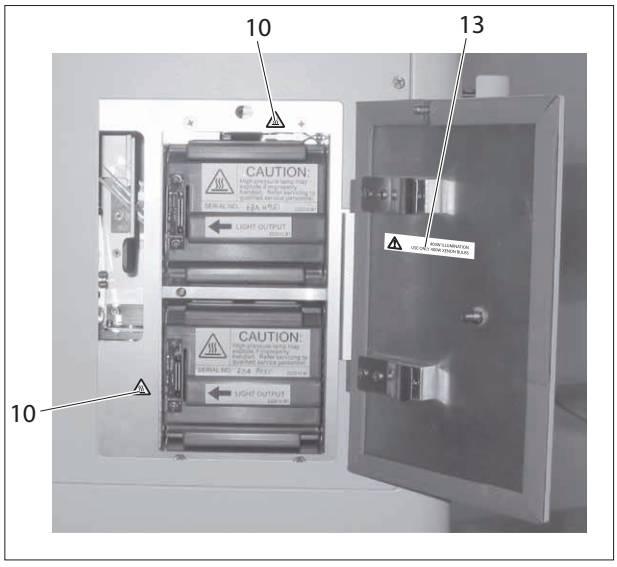
CAUTION

Danger of skin burns. The lamp insert gets very hot.

- ▶ Check that the cover has cooled before you replace the lamp.

3.5 Signs and labels

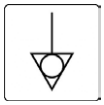
A



1

For installation purpose only

2



Equipotential bonding

3

Brasil Certification

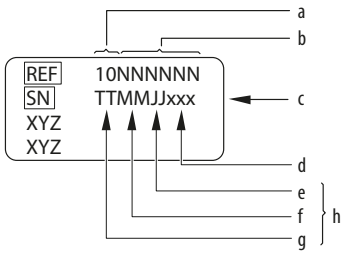
4

Grounding reliability can only be achieved when EQUIPMENT is connected to equivalent receptacle marked "Hospital only" or "Hospital Grade". For US Canada only

La fiabilité de la mise à la terre n'est assurée que si l'équipement est connecté à une prise équivalente, marquée "Hôpital seulement" ou "Qualité hôpital".

Grounding label (Only for US/Canada)

5



Fabrication label

- a Prefix number
- b Leica system article no.
- c Serial number
- d Incremental numbers tarting at 1 for each batch
- e JJ = year (2 digits)
- f MM = month (2 digits)
- g TT = day (2 digits)
- h Production starting date

6

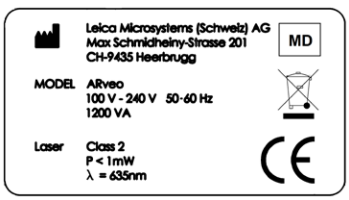
System weight label

7

CAUTION: Federal (USA) law restricts this device to sale by or on the order of a licensed healthcare practitioner

US Info Label

8



Type label

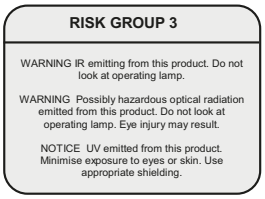
9

Follow the user manual

10

Warning of hot surface

11



Warning of XENON light emission

12

DO NOT USE IN OPHTHALMOLOGY ⚠

NE PAS UTILISER EN OPHTHALMOLOGIE ⚠

Contraindication

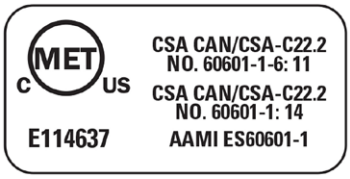
13

⚠ 400W ILLUMINATION
USE ONLY 400W XENON BULBS

⚠ ÈCLAIRAGE 400W
UTILISER UNIQUEMENT DES LAMPES AU XENON 400W

Warning Lamps

14



MET Label

15

⚠ Only to be operated by trained personnel

⚠ Utilisation réservée à un personnel formé

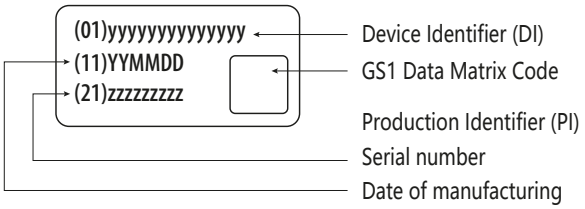
Trained Personnel

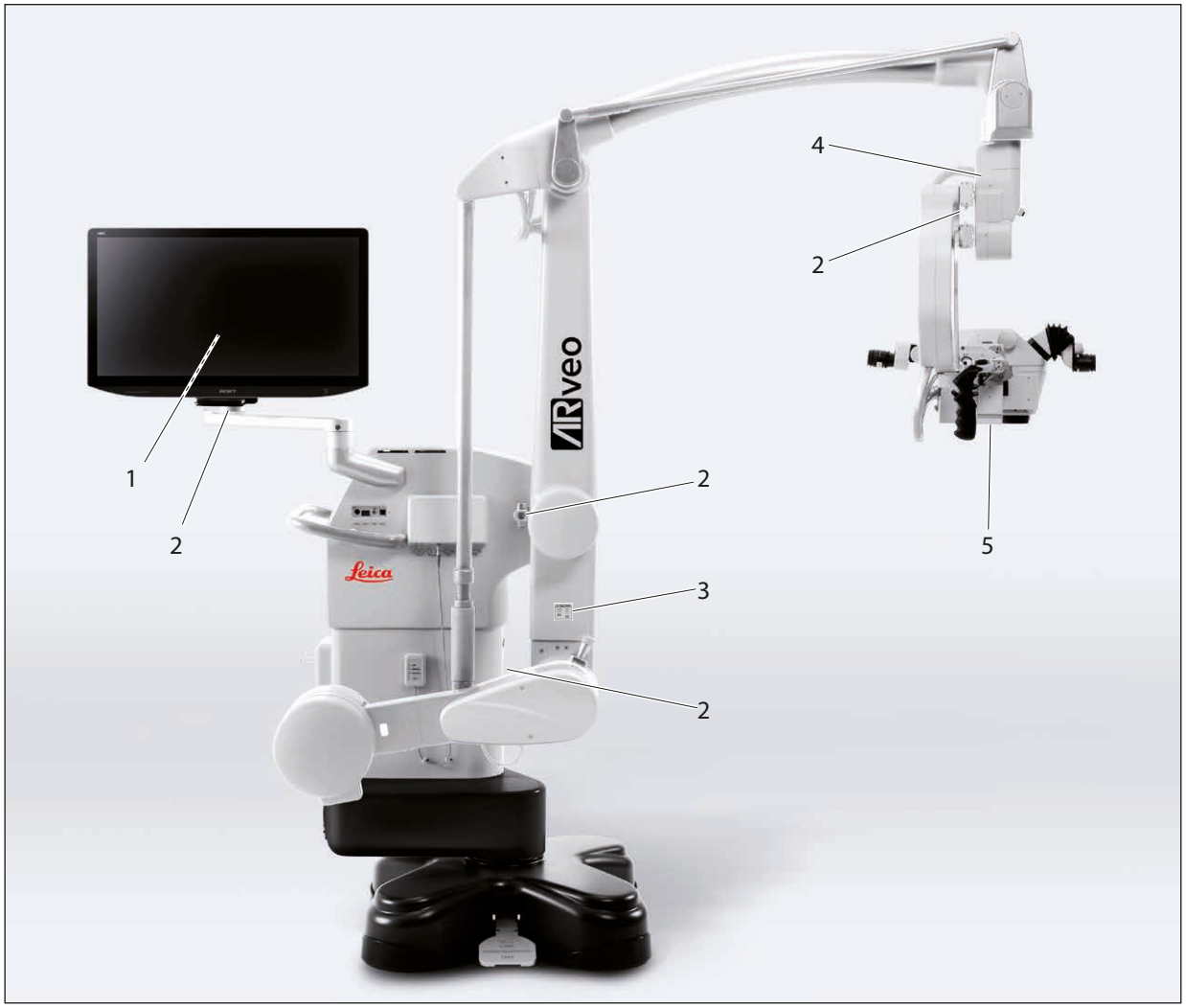
16

ANVISA n°
XXXXXXXXXX

ANVISA Registration Label

17 UDI Label





1 Max. 16 kg (35.27 lbs)

Monitor weight label

2

Warning sign for squeezing hands or fingers

3 CAUTION
Locked Fermé
Free Ouvert

For installation only

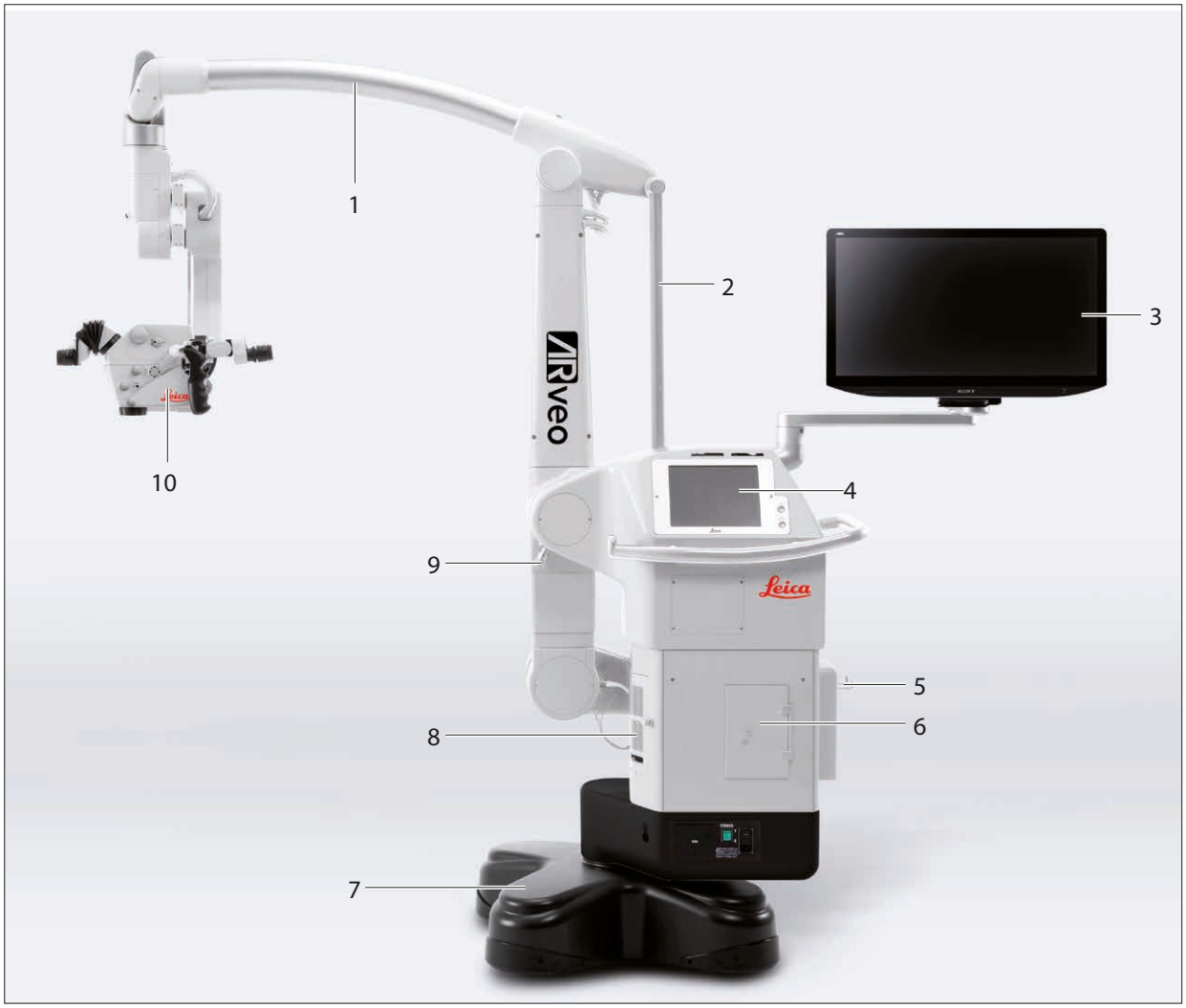
4

LASER RADIATION
DO NOT STARE
INTO BEAM
CLASS 2 LASER PRODUCT
P < 1 mW
λ = 635 mm
IEC 60825-1: 2014 Ed. 3

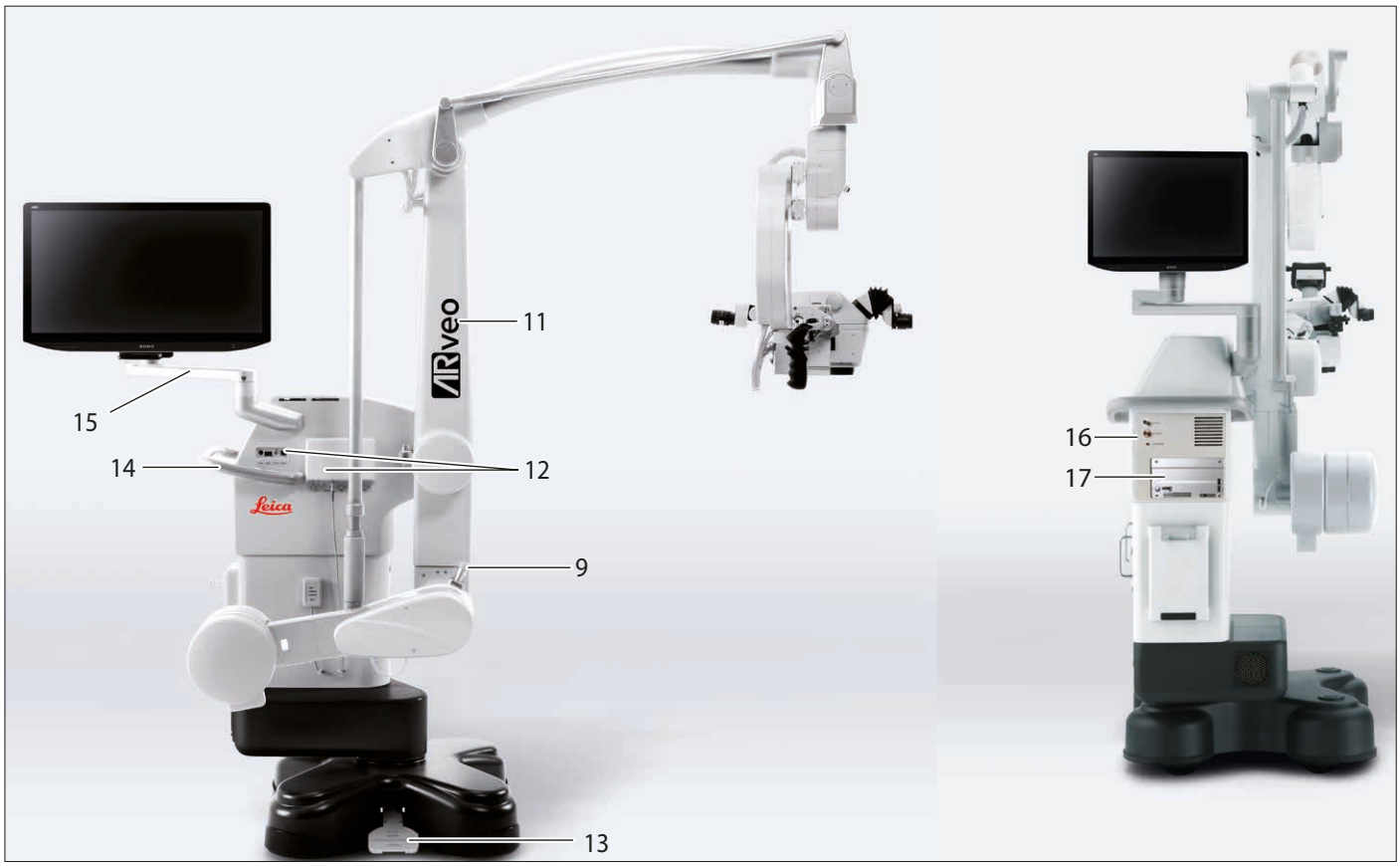
RAYONNEMENT LASER
NE PAS REGARDER
DIRECTEMENT
DANS LE FAISCEAU
PRODUIT LASER DE CLASSE 2
P < 1 mW λ = 635 nm
IEC 60825-1 Ed.3 2014

4 Design

4.1 ARveo stand



1 Arm system
2 Tension rod
3 Video monitor (optional)
4 Control unit with touch panel
5 Suspension device for footswitch
6 Illumination unit
7 Base
8 Interface panel
9 Lock (for installation purpose only)
10 Leica M530 Optics carrier

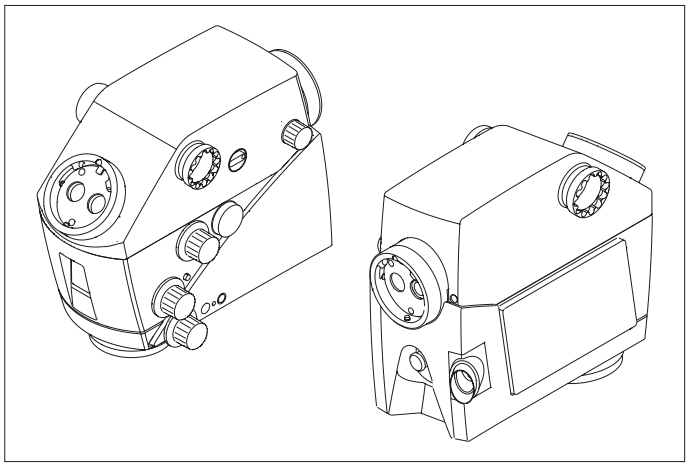


9 Lock (for installation only)
11 Vertical arm
12 Interface panel
13 Footbrake
14 Handrail
15 Monitor arm
16 Camera control unit (optional)
17 Recording unit (optional)

With its open architecture the ARveo provides space for holding the camera and recording units.

4.2 Leica M530 Optics carrier

4.2.1 Leica M530 with ULT530



- Optics carrier with integrated camera for visible light Leica HD C100 (optional)
- Interface for assistants, either to the left and right side or to the back
- Main surgeon and back assistant interface, 360° rotatable both
- Back assistant interface with fine focus knob
- For use with Image Injection Module CaptiView

The Leica Accessories functions are described in the corresponding user manuals.

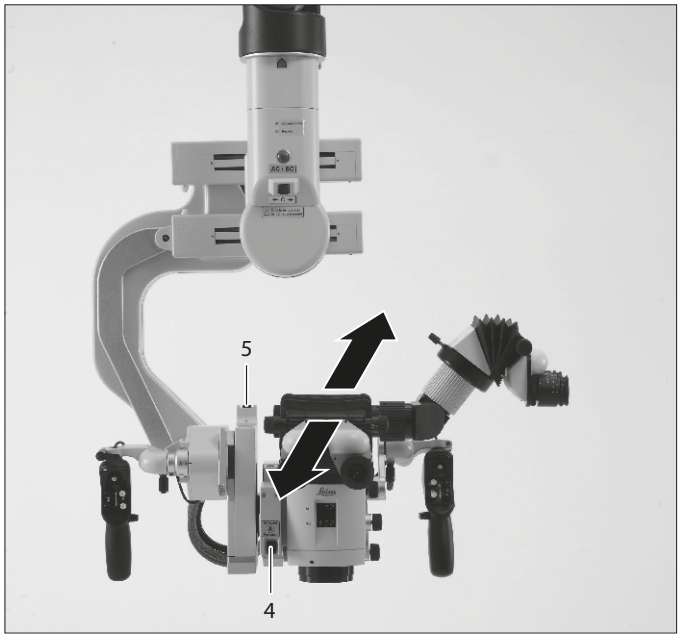
5 Functions

5.1 Balancing system

With a balanced surgical microscope ARveo you can move the optics carrier in any position without tilting or falling down.
After balancing all movements during operation only need a minor force.

5.1.1 Balancing the optics carrier

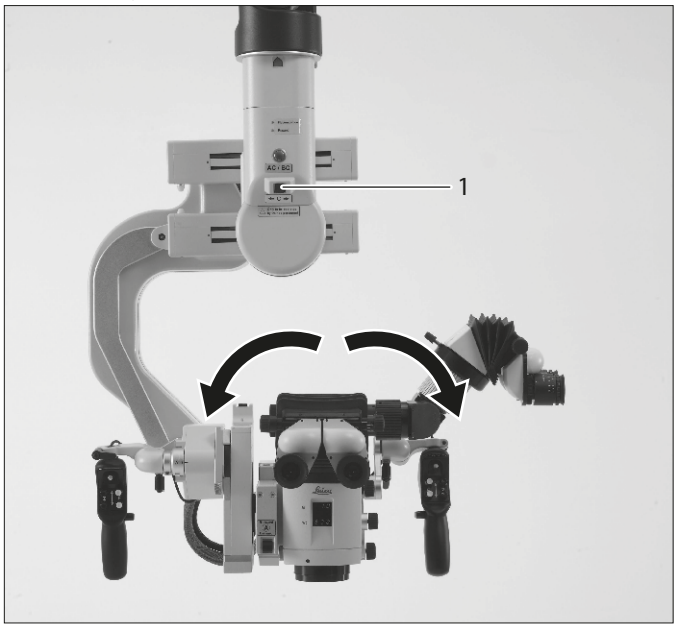
On the optics carrier Leica M530 two directions of movement are balanced: A and B.



The essential performance of the ARveo is:
Providing sufficient light to the situs and to guarantee mechanical locking of the optics carrier in any possible positioning.

5.1.2 Balancing the arm system

On the arm system the direction of movement C is balanced.



5.1.3 Balancing the parallelogram

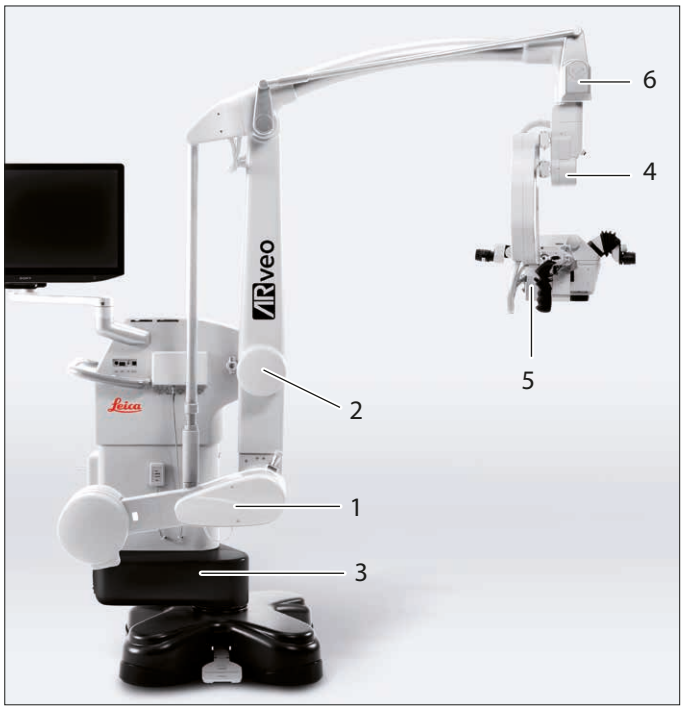
The parallelogramm balances the up/down movement (direction D).

If the direction D cannot be balanced, a weight disk has to be added or removed, see section 7.6.4.

5.2 Brakes

The ARveo may be moved only with released brakes.
► Do not perform any movements when the brakes are locked.

The ARveo surgical microscope has 6 electromagnetic brakes which stop the movements of the stand and surgical microscope.



- Up/down and forward/back in parallelogram (1 and 2)
- Foot (3)
- In arm system (4)
- On the A and B carriages of surgical microscope (5)
- In the rotary joint (6)

Brakes are operated via handle or footswitch, if used.

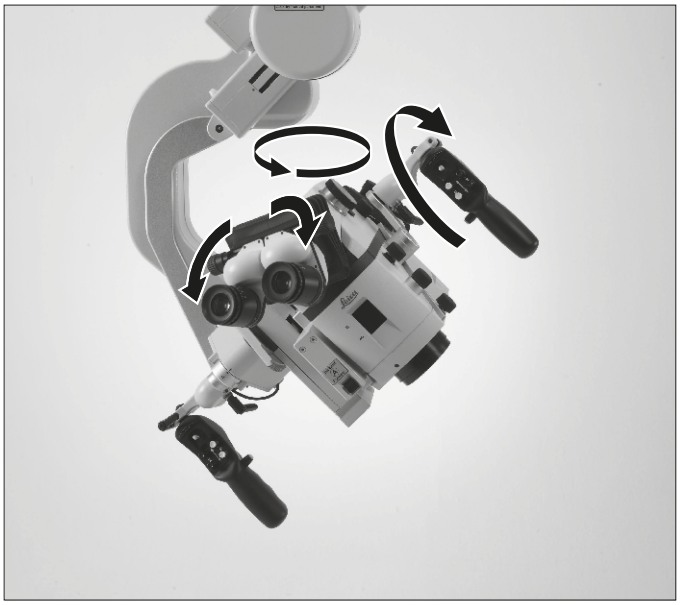
The button of a handle / footswitch with the assigned function "Selected Brakes" (refer also to the chapter on "Assigning handles", page 48) can trigger two different brake combinations: "Focus Lock" or "XYZ Free".

5.2.1 Selected Brakes – XYZ Free

The following movements can be performed with the surgical microscope when the brake combination "XYZ Free" is activated:

5.2.2 Selected Brakes – Focus Lock

The following movements can be performed with the surgical microscope when the brake combination "Focus Lock" is activated:



5.3 Illumination

The illumination of the surgical microscope Leica M530 is a xenon lamp and is located in the stand. Illumination is routed to the optics carrier via fibre optics cable.
There are two identical lamps. In case of a failure of the lamp in use, the other lamp can be selected, either on the touchscreen or manually.

5.3.1 AutoIris

AutoIris synchronizes the illumination field automatically according to the magnification factor.
Using the manual override, the illumination field can be adjusted manually.

5.3.2 BrightCare Plus

BrightCare Plus is a safety function which automatically limits the maximum brightness depending on the working distance.
Excessively bright light can, in combination with a short working distance, cause burns to patients.

> When shipped from the factory, the "BrightCare Plus" safety function is activated for all users.

Luminous energy
The optics of the ARveo surgical microscope have a variable working distance of between 225 and 600 mm. The system is designed in such a way that it delivers sufficient light to produce a bright image even at a long working distance of 600 mm.
In accordance with the formula $E_V = I_V/d^2$, the light quantity continually increases by 710 % when the working distance is changed from 600 to 225 mm.
(E_V = light intensity, I_V = brightness,
d = distance from light source).
This means that less light is required to work with the microscope at a shorter distance than at a greater distance.

> It is advisable to begin with a low light intensity and increase it until an optimum level of illumination is achieved.

Heat release
Heat from non-visible light (over 700 nm) is filtered out of the light from the used xenon light source. Nevertheless, white light also always develops heat. An excessive amount of white light can lead to overheating of tissue and metal objects.

> It is advisable to begin with a low light intensity and increase it until an optimum level of illumination is achieved.

BrightCare Plus display

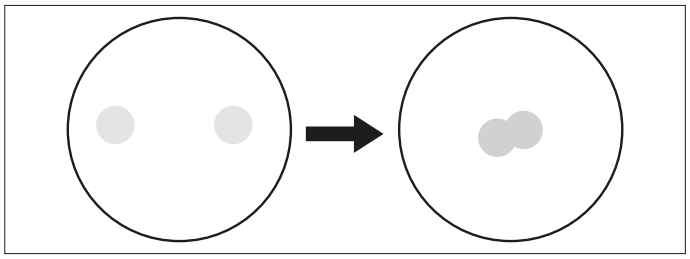
When BrightCare Plus is activated, the red line on the brightness adjustment bar shows the maximum adjustable brightness for the current working distance.
The brightness cannot be set to a level beyond the red line unless the BrightCare Plus function is intentionally deactivated.
When the working distance is reduced too much at a set brightness, the brightness is reduced automatically.

5.4 Leica FusionOptics

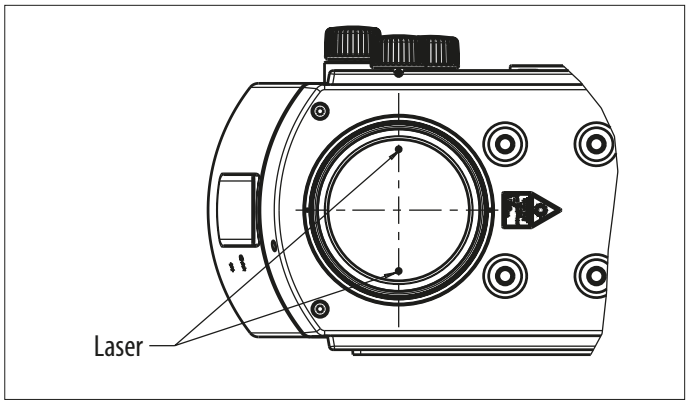
This feature provides an augmentation in resolution and depth of field for an ideal 3-D optical image.
Leica FusionOptics operates with two separate beam paths with different information: the left beam path is optimized for high resolution, the right beam path for optimum depth of field.
The human brain merges these two very different images to a single, optimal spatial image.

5.5 Leica SpeedSpot

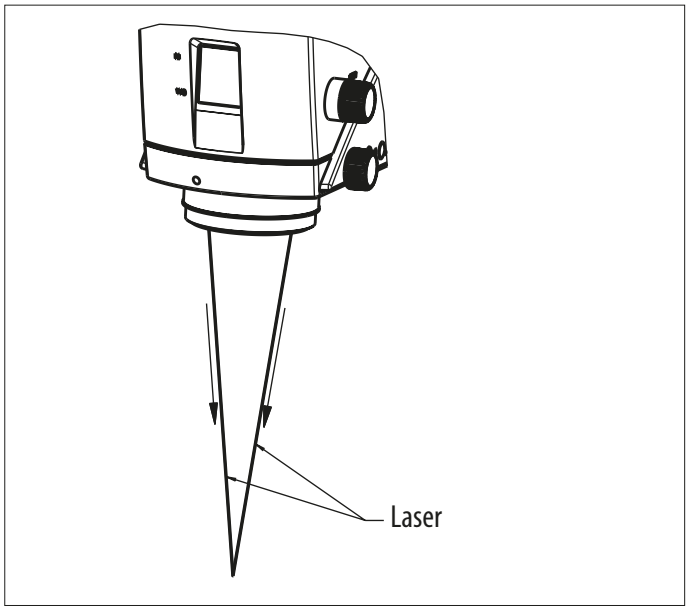
Leica M530 is equipped with the Laser focussing aid Leica SpeedSpot.
If Leica SpeedSpot is activated for the current user (see page 49), the focussing aid is released when the brakes are released or when focussing.
Two convergent light beams meet exactly in the focussing point of the microscope.



Exit of the laser beams

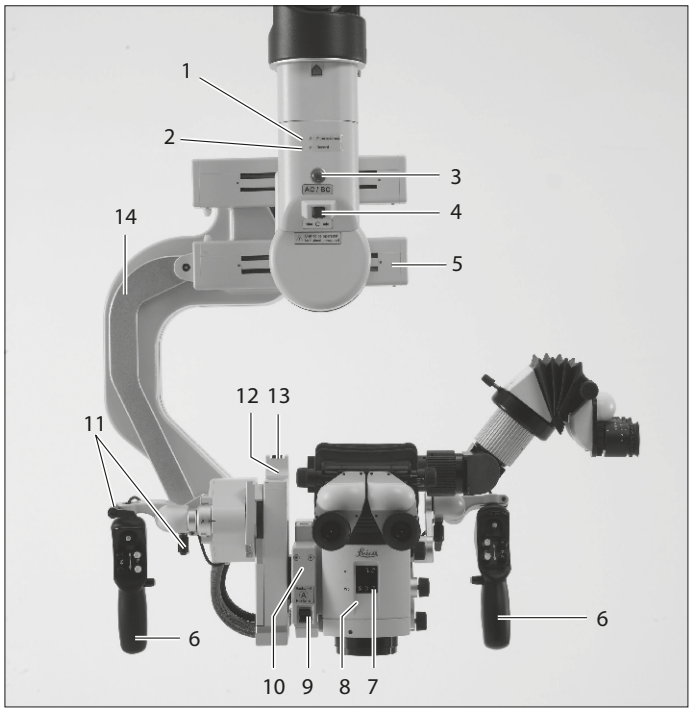


Course of the laser beams



6 Controls

6.1 Leica M530 Microscope with arm system



1 Status LED for fluorescence
- LED illuminates in blue = FL400 mode
- LED illuminates in yellow = FL800 mode
- LED illuminates in green = playback mode
- LED illuminates in magenta = GLOW800 mode
- LED illuminates in cyan = FL560 mode

2 Status LED for recording
LED lights up red = recording in progress

3 Push-button for intraoperative AC/BC balancing

4 Switch for manual balancing of the C carriage

5 C carriage

6 Handle

7 Display of set working distance and magnification

8 Leica M530 Optics carrier

9 Switch for manual balancing of the A carriage

10 A carriage

11 Handle clamping lever

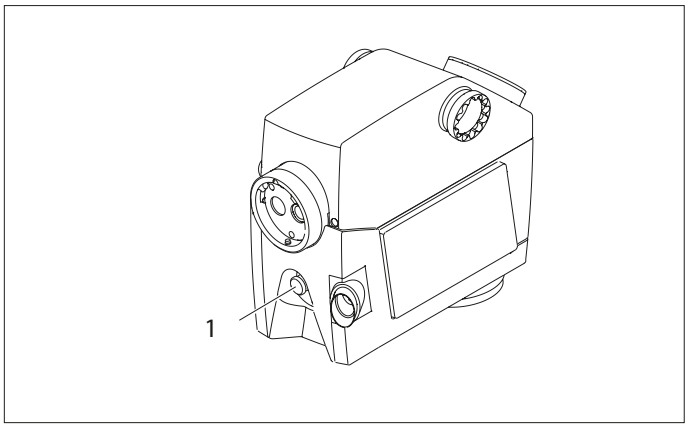
12 Switch for manual balancing of the B carriage

13 B carriage

14 Microscope carrier

6.1.1 Optics carrier – rear

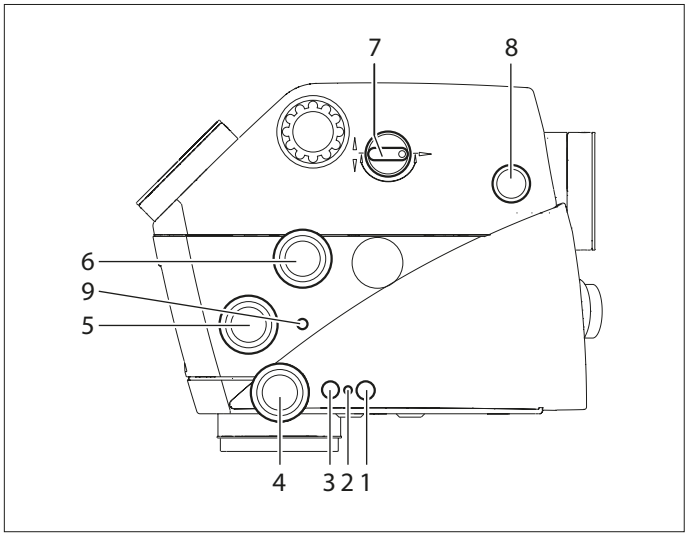
Leica M530 with ULT530 or GLOW800



1 Optical fiber connection

6.1.2 Optics carrier – controls

Leica M530 with ULT530 or GLOW800



Button "Focus lock" (counter-sunk)

2 LED Focus lock active

3 Receiver Remote Control Camera

4 Rotary knob "Working distance" (emergency operation only)

5 Rotary knob "AutoIris manual override"

6 Rotary knob "Magnification" (emergency operation only)

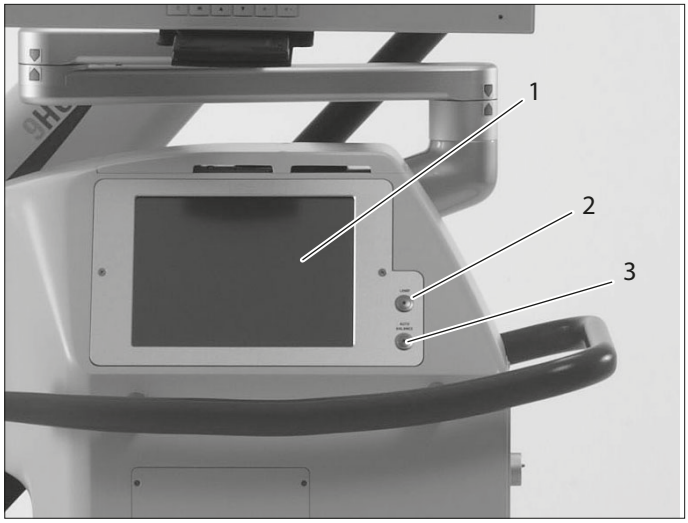
7 Assistant back/side

8 Fine focus back assistant

9 Button "AutoIris reset"

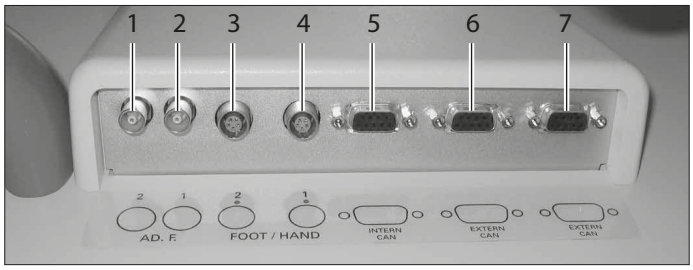
The Leica Accessories controls are described in the corresponding user manuals.

6.2 Control unit



1 Touch panel
2 Push-button with illumination LED (on/off)
3 Push-button with LED for Auto Balance

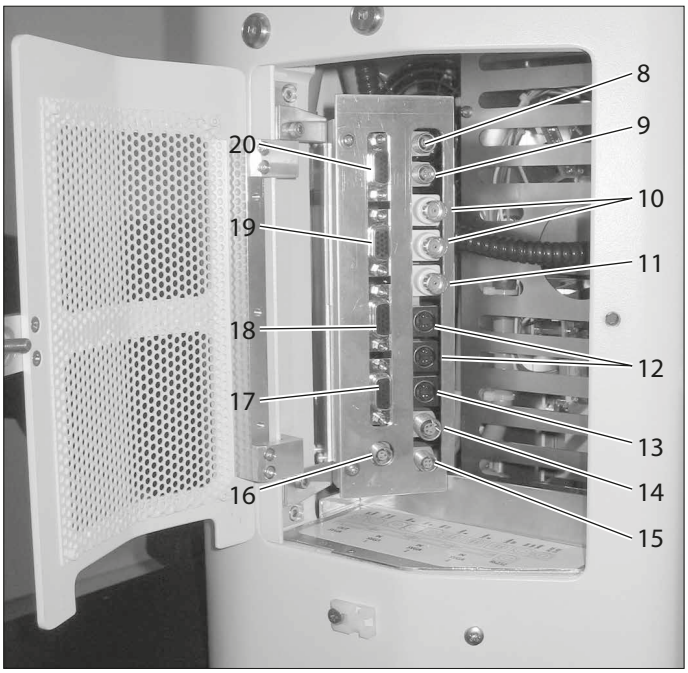
6.3 Interface panels



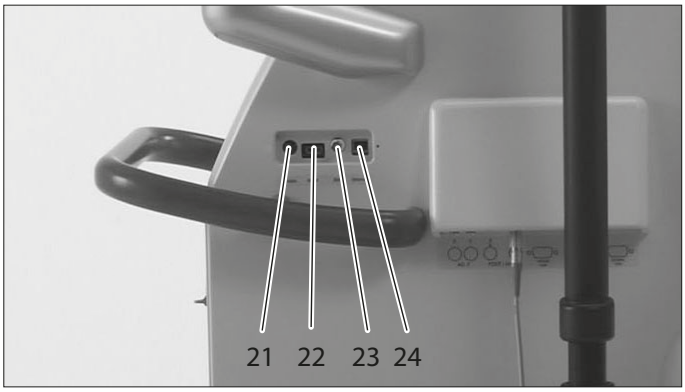
1 AD.F. Additional Function 2
2 AD.F. Additional Function 1
3 Foot/handswitch 2 *
4 Foot/handswitch 1 *
5 Internal CAN **
6 External CAN ***
7 External CAN ***

* Only foot and handswitches supplied by Leica Microsystems (Schweiz) AG may be connected to the foot/handswitch 1 and 2 (3) and (4) terminals.
** not used
*** Only systems verified by Leica Microsystems (Schweiz) AG may be connected here.

AD.F. 1 and 2 are digital relay outputs that can switch 24 V/2 A.



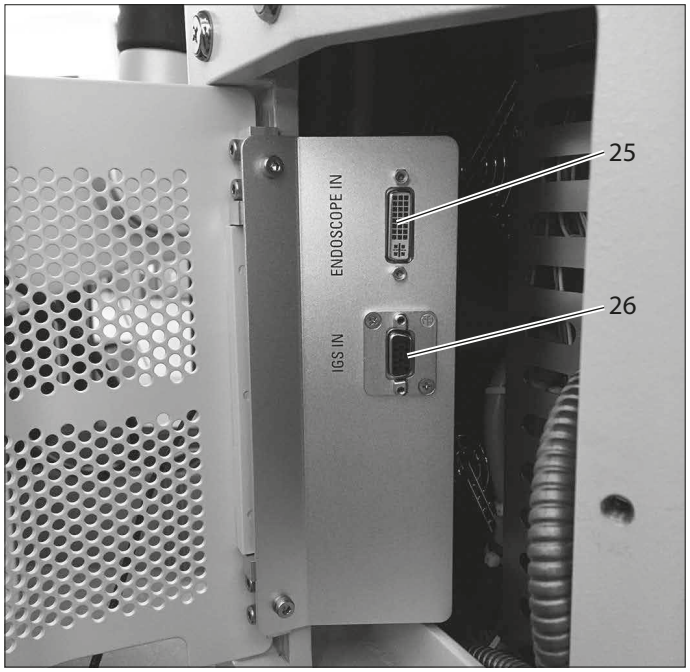
8 not in use
9 camera input, optional
10 BNC IN (2x)
11 BNC OUT
12 S-video IN (2x)
13 S-Video OUT
14 only for Storz footswitch
15 only for Sony 12 V NIR camera
16 only for Leica recording systems
17 XGA IN 3 from common, e.g., endoscope
18 XGA IN 2 from IGS
19 XGA IN 1 from Leica FL800 ULT (SGA output from documentation/ recording system)
20 XGA OUT CaptiView



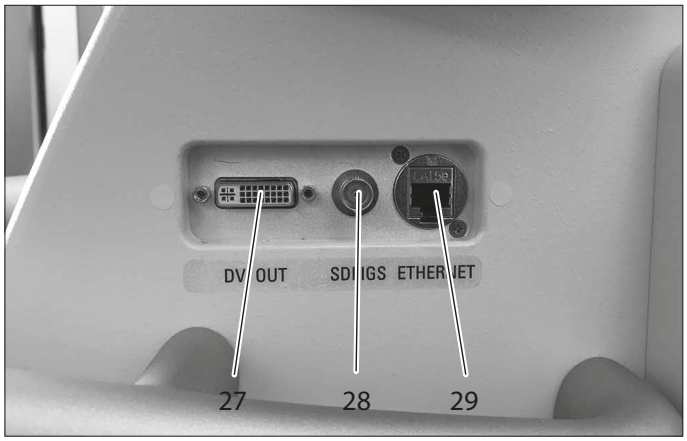
21 S-Video
22 HDMI
23 BNC
24 Ethernet***

Connections (21) to (23) are couplings for guiding connections of an optional video control system unit or a camera control unit towards the outside.
Medically approved devices only.

Interface panels with GLOW800

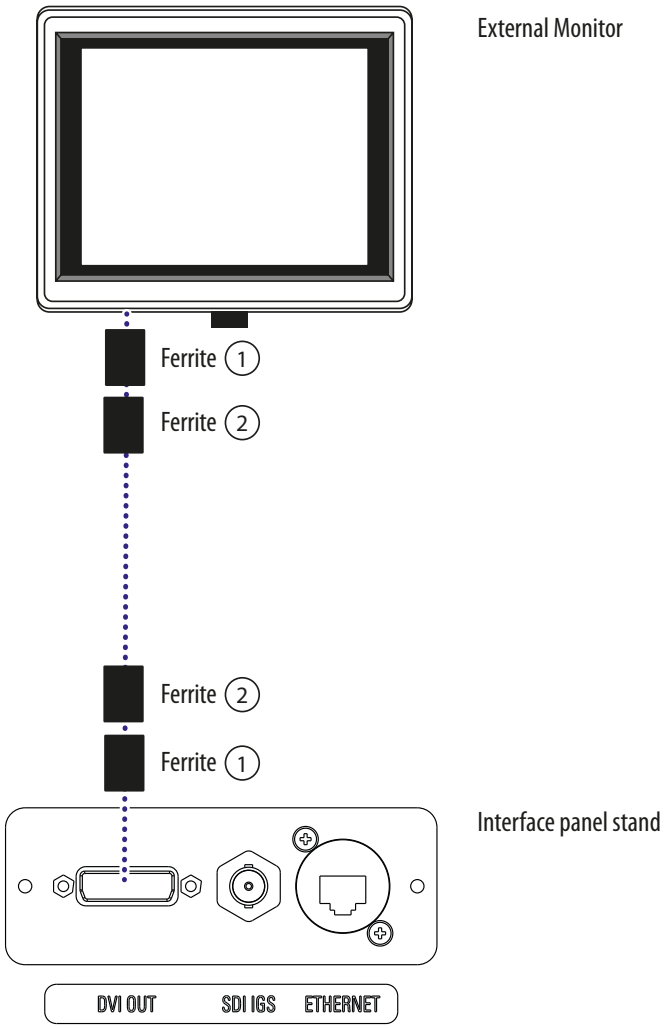


25 DVI In from endoscope camera (HDMI compatible)
26 XGA in from IGS systems



27 DVI out for external monitor (note the requirements regarding EMC on this page)
28 SDI out for IGS systems
29 Ethernet***

*** Only systems verified by Leica Microsystems (Schweiz) AG may be connected here.



Requirements regarding EMC

To reduce emission and ensure EMC compatibility of external monitors connected to the DVI outlet (see picture).

The cable has to be equipped with 2 ferrites each (outlet at stand an inlet at Monitor).

Specification for the ferrites:

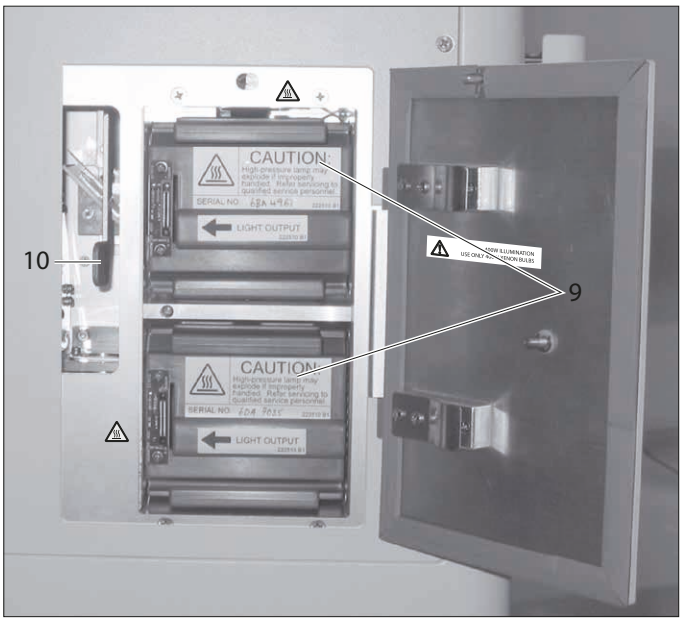
(1) Würth 74271622 (tested ferrite)

(2) Würth 74271112 (tested ferrite)

Ferrites with the same frequency/impedance charateristic can also be used.

6.4 Stand

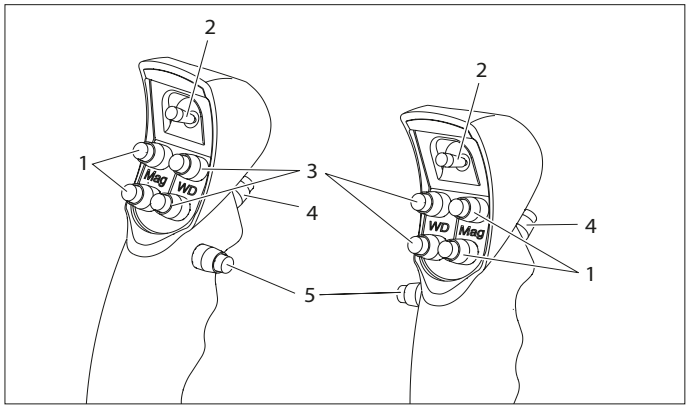
1 Illumination unit
2 Access door
3 Screw knob
4 Master switch for ARveo surgical microscope
5 Power supply
6 Equipotential bonding socket
For connecting the ARveo to an equipotential bonding device.
This is part of the customer's building installation.
Observe the requirements of EN 60601-1 (§ 8.6.7).
7 Fuse box flap



8 Lamp inserts for main illumination or backup illumination
9 Lever for switching to standby illumination (emergency operation)

The ARveo surgical microscope has a primary illumination source and an equivalent standby illumination source.

6.5 Handles



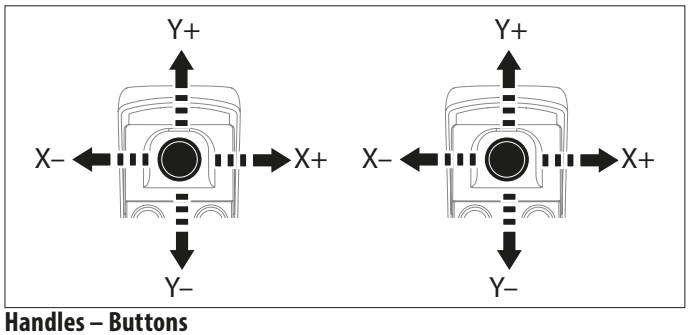
Assignment in the factory setting

1 Magnification
2 4-function joystick
3 Working distance
4 Release all brakes
5 Release preselected brakes

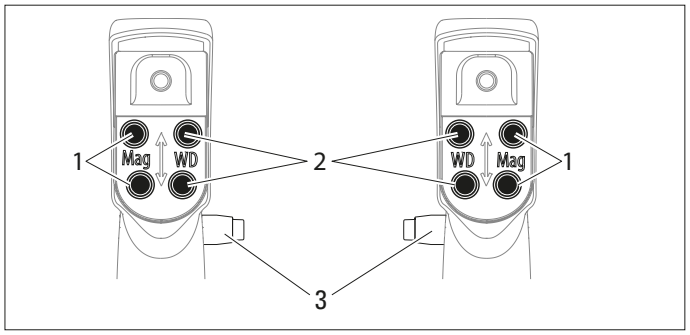
You can assign switches 1, 2, 3 and 5 of the handles individually for each user in the configuration menu.
In all presets, key (4) releases all brakes. This key cannot be configured. For the joystick and the other keys presets are available according to your task.

Presets for Cranial / Spinal / ENT

Handles – Joystick



Handles – Buttons

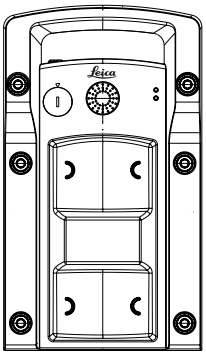


1 Magnification
2 Working distance
3 Selected brakes

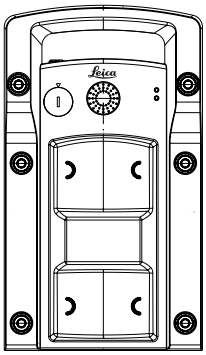
6.6 Footswitch

This is an overview of all possible footswitches you can use to control your ARveo surgical microscope.

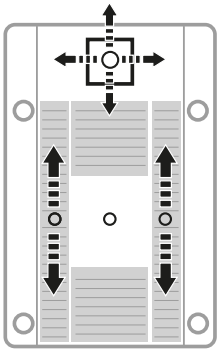
Footswitch
- 12 functions
- crosswise



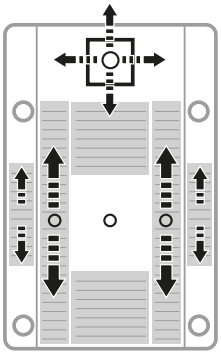
Footswitch
- 14 functions
- crosswise



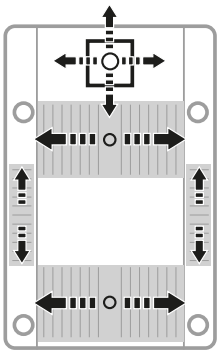
Footswitch
- 12 functions
- lengthwise



Footswitch
- 16 functions
- lengthwise

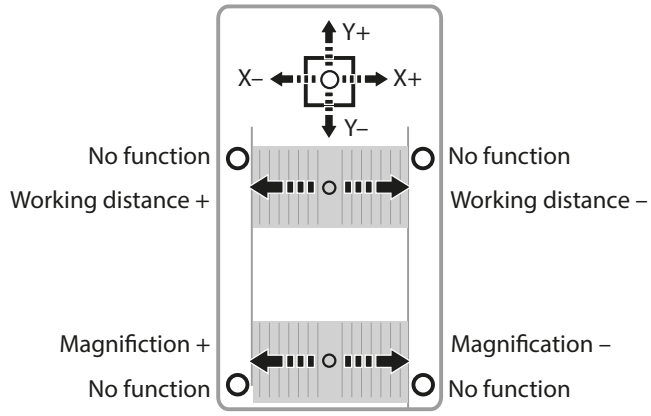


Footswitch
- 16 functions
- crosswise

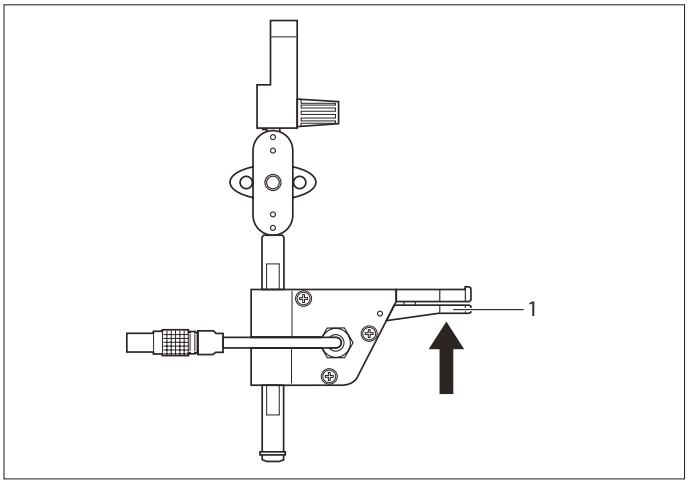


- Footswitches can be assigned individually for each user in the configuration menu.

6.6.1 Presets for Cranial / Spinal / ENT



6.7 Mouth switch



1 Release "XYZ Free" brakes

7 Preparation before surgery

7.1 Transportation

WARNING

Danger of injury due to:

- **uncontrolled lateral movement of the arm system,**
- **tilting of the stand,**
- **trapping of feet in lightweight shoes beneath the casing of the base.**

► For transportation, always move the ARveo surgical microscope into the transport position.
► Never move the stand while the unit is extended.
► Never roll the stand or OP equipment over the cables lying on the floor.
► Always push the ARveo surgical microscope; never pull it.

CAUTION

Surgical microscope can move without warning.

► Always lock the footbrake when you are not moving the system.

NOTE

Damage to the ARveo surgical microscope during transportation.

► Never move the stand in the extended condition.
► Never roll the stand or OP equipment over the cables lying on the floor.

NOTE

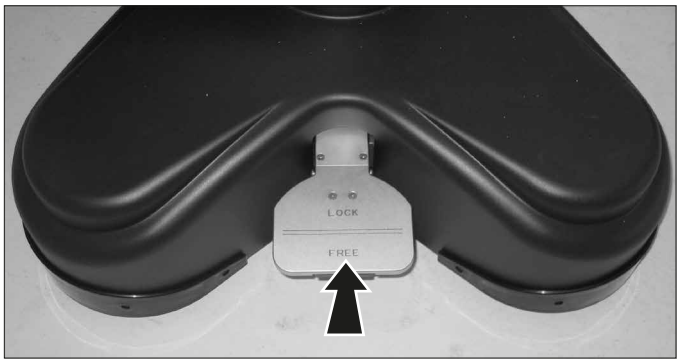
Damage to the ARveo surgical microscope due to uncontrolled tilting.

► Hold the handle when releasing the brake.

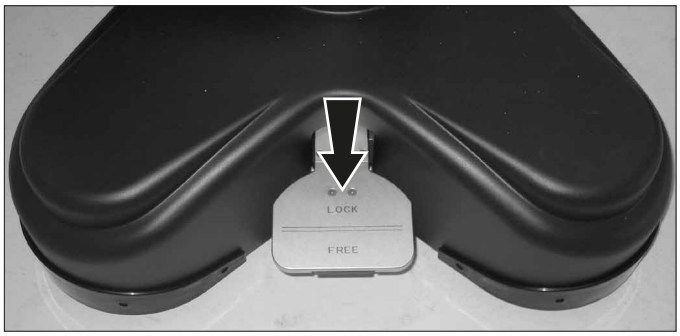
► Ensure that the ARveo is in the transport position.

In case the ARveo is not in transport position, refer to section 8.4.

► Depress the footbrake at the front end (FREE).
The footbrake disengages and is released.



► Move the ARveo using the handle.
► Depress the footbrake at the rear end (LOCK) until it engages.



7.2 Installing optical accessories

WARNING

Risk of injury due to downward movement of the surgical microscope.

- ► Complete all preparations and adjustments to the stand before the operation.
- ► Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
- ► Balance the ARveo after re-equipping it.
- ► Do not release the brakes when the instrument is in an unbalanced state.
- ► Before re-equipping during the operation, first swing the microscope away from the operating field.
- ► Never carry out the intraoperative AC/BC balancing above the patient.

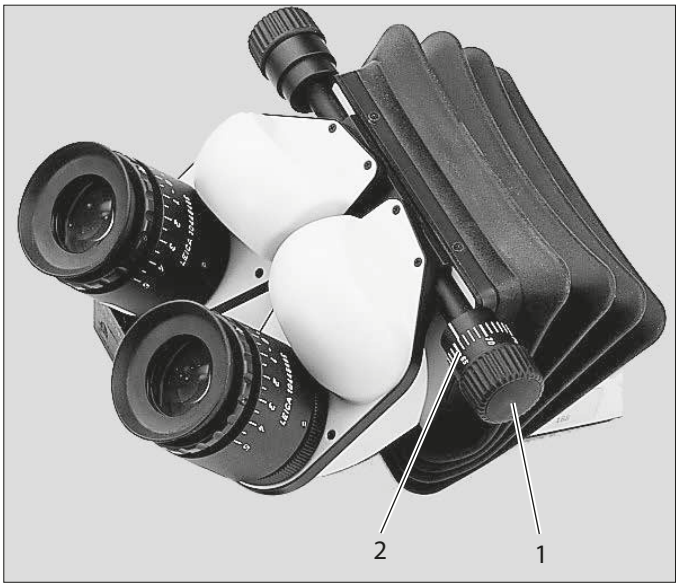
► Make sure that the optical accessories are clean and free of dust and dirt.

7.3 Setting the binocular tube

7.3.1 Setting the interpupillary distance

► Adjust the interpupillary distance to a value between 55 mm and 75 mm.

► Using the adjusting wheel (1), set the interpupillary distance that a circular image field can be seen.

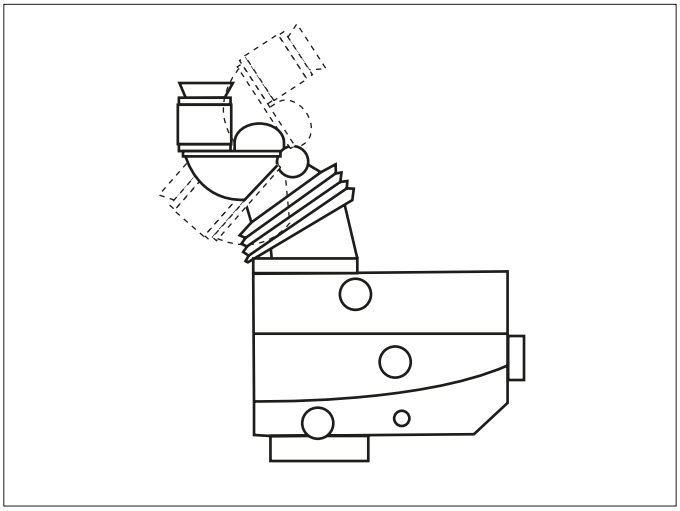


This procedure has to be performed only once for each user. The measured value (2) can be stored for each user in the "User Settings" menu under "Tube Settings" (see page 44).
The stored value can be read out with "Show Settings".

7.3.2 Adjusting the tilt

► Hold the binocular tubes with both hands.

► Tilt the binocular tube upwards or downwards until a comfortable position for viewing is reached.



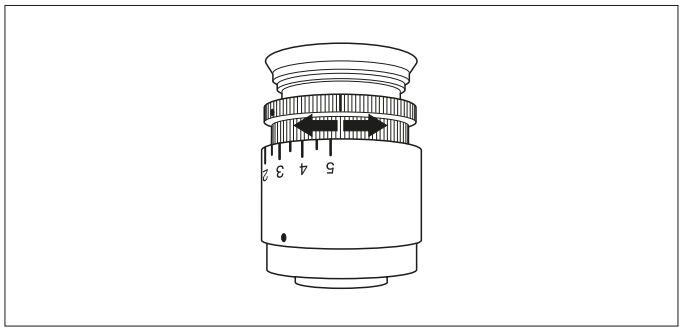
7.4 Adjusting the eyepiece

7.4.1 Determining/adjusting diopter settings for users

The individual diopters can be adjusted continuously for each eyepiece from +5 to –5. The diopters must be set exactly and separately for both eyes. Only this method will ensure that the image will stay in focus within the entire zoom range = parfocal. The surgical microscope ensures a high degree of fatigue resistance when the diopter setting is correct for both eyes.

! A parfocally adjusted microscope ensures that assistant's view and monitor image will always remain sharp, regardless of the selected magnification.

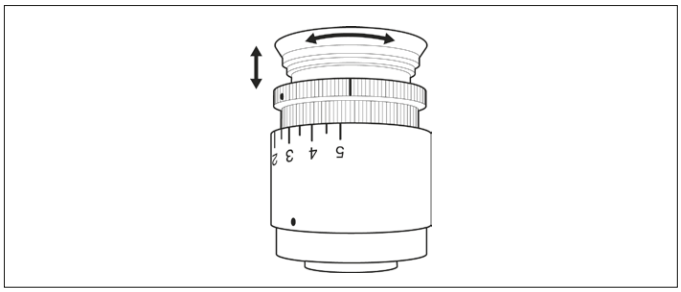
- ► Select the minimum magnification.
- ► Place a flat test object with sharp contours under the lens at working distance.
- ► Focus the microscope.
- ► Set the maximum magnification.
- ► Focus the microscope.
- ► Set the minimum magnification.



- ► Without looking into the eyepieces, turn both eye lenses to +5 diopters.
- ► Slowly turn the eyepieces towards –5 individually for each eye until the test object appears in sharp focus.
- ► Select the highest magnification and check the sharpness.

! This procedure has to be performed only once for each user. The measured value can be stored for each user in the "User Settings" menu under "Tube Settings" (see page 44).

7.4.2 Adjusting the pupillary distance



- ► Rotate the eyecups up or down until the desired distance is set.

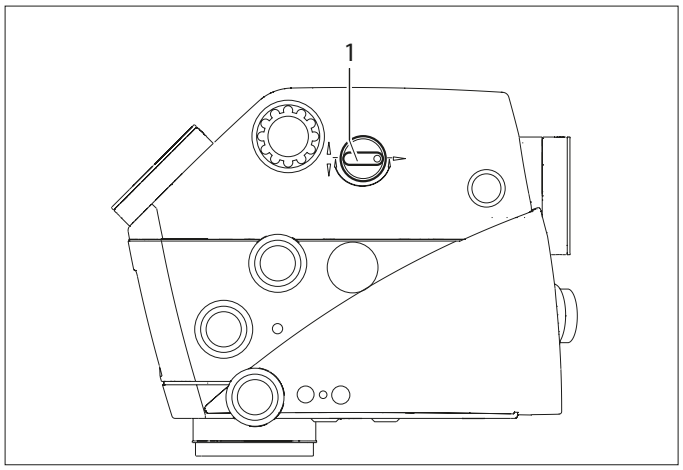
7.4.3 Checking parfocality

- ► Place a flat test object with sharp contours under the objective at working distance.
- ► Zoom through the whole range, observing the test object.

! The image sharpness must remain constant at all magnifications. If this is not the case, check diopter settings of the eyepieces.

7.5 Selecting the assistant

7.5.1 Leica M530 with ULT530



► Using knob (1) switch the light from the back assistant to the side assistants.

7.6 Stand settings

7.6.1 Automatic balancing of the ARveo

WARNING

Danger of injury due to movement of the microscope during the balancing process.

► Do not sit or stand immediately next to the microscope during the balancing process.

WARNING

Risk of injury due to downward movement of the surgical microscope.

► Complete all preparations and adjustments to the stand before the operation.
► Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
► Balance the ARveo after re-equipping it.
► Do not release the brakes when the instrument is in an unbalanced state.
► Before re-equipping during the operation, first swing the microscope away from the operating field.
► Never carry out the intraoperative AC/BC balancing above the patient.

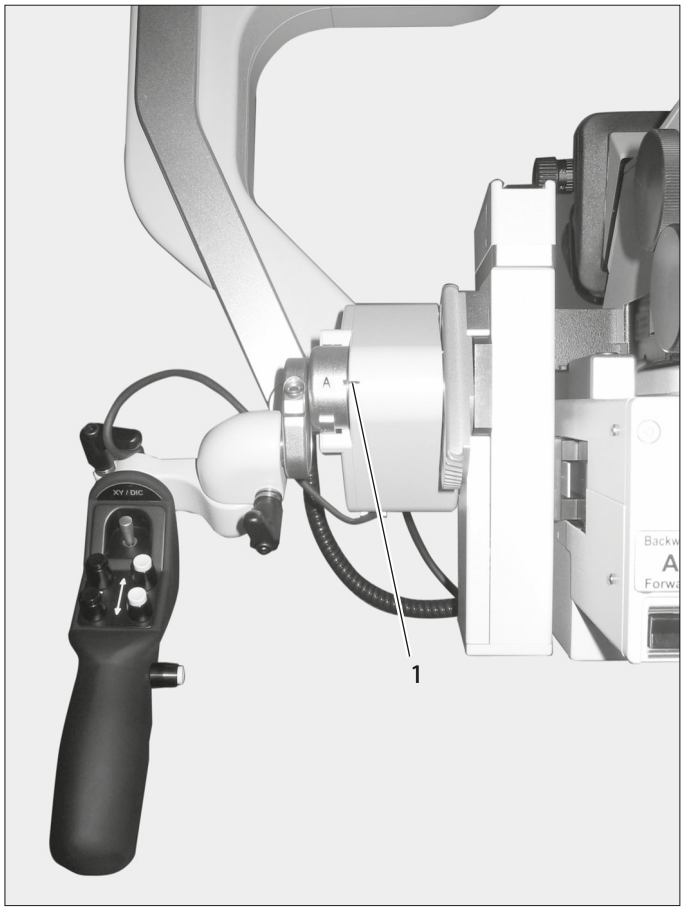
WARNING

Danger of injury to the eyes due to possibly hazardous optical infrared and UV radiation.

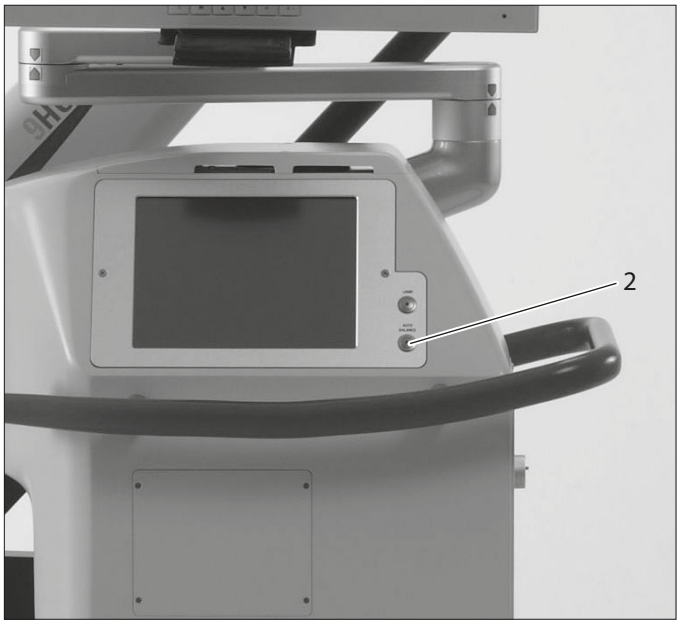
► Do not look at the operating lamp.
► Minimize exposure to eyes or skin.
► Use appropriate shielding.

► Switch on the microscope, see section 8.1.
► Make sure that all accessories needed are installed and that they are in the permitted weight range (see "Specifications" on page 63).
► Align the accessories in working position.

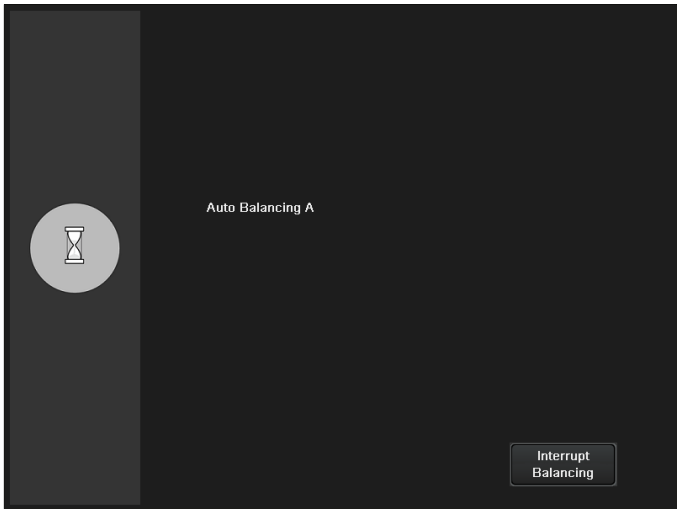
► Press the "All Brakes" button on the handle and move the optics carrier into the A-position.
The marking (1) must point towards A.



► Press the autobalancing push-button (2) on the control unit.
During the balancing procedure, the push-button flashes green and an acoustic signal sounds (can be deactivated in the service menu).

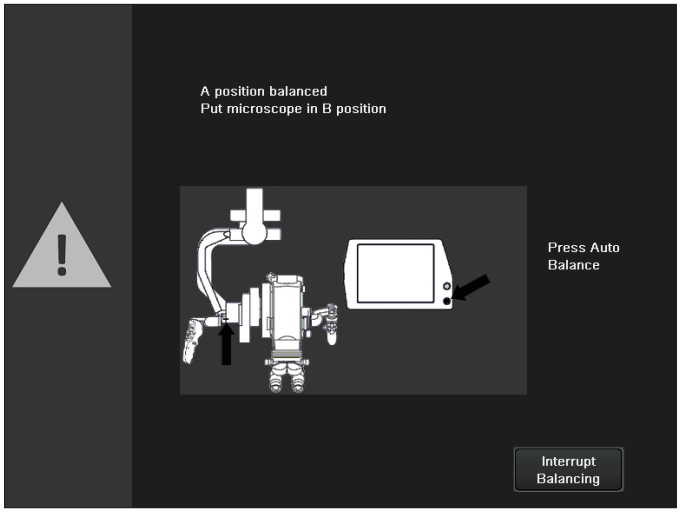


The following dialog window appears on the touch panel monitor:

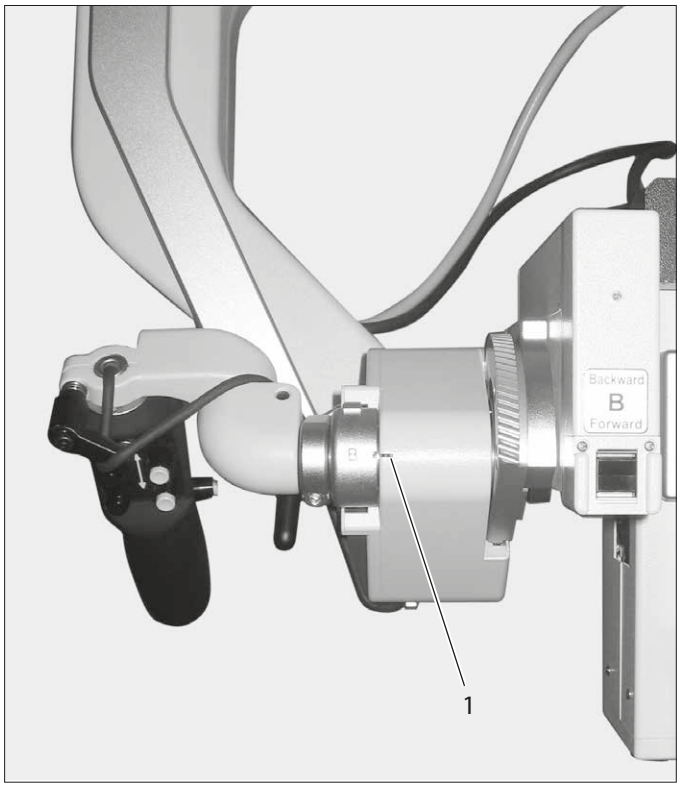


The balancing procedure can be canceled at any time using "Interrupt Balancing".

The first balancing step is completed when the acoustic signal no longer sounds and the autobalancing push-button is no longer flashing.



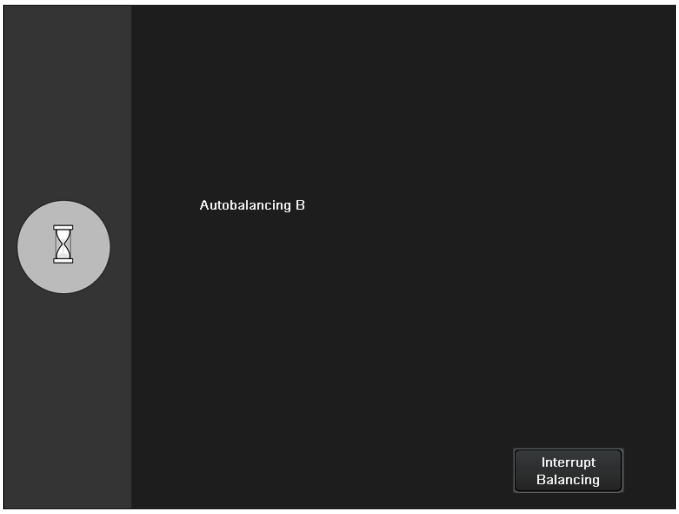
► Press the "All Brakes" button on the handle, tilt the optics carrier forwards 90° and move it into the B-position.
The marking (1) must be pointing towards B.



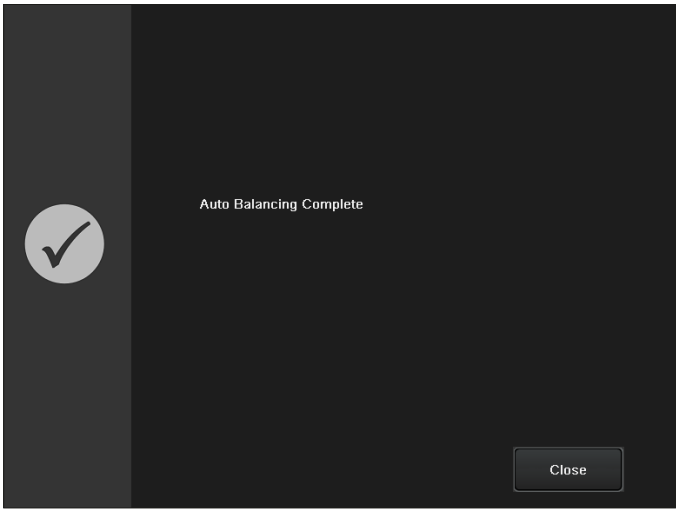
If the mounted accessories (e.g., the assistant's binocular tube) do not allow a 90° tilt movement, turn the binocular tube upwards, tilt the optics carrier forwards and move the binocular tube back into its working position.

► Press the autobalancing push-button on the control unit again.
During the balancing procedure, the push-button flashes yellow and an acoustic signal sounds (can be deactivated in the service menu).

The following dialog window appears on the touch panel:

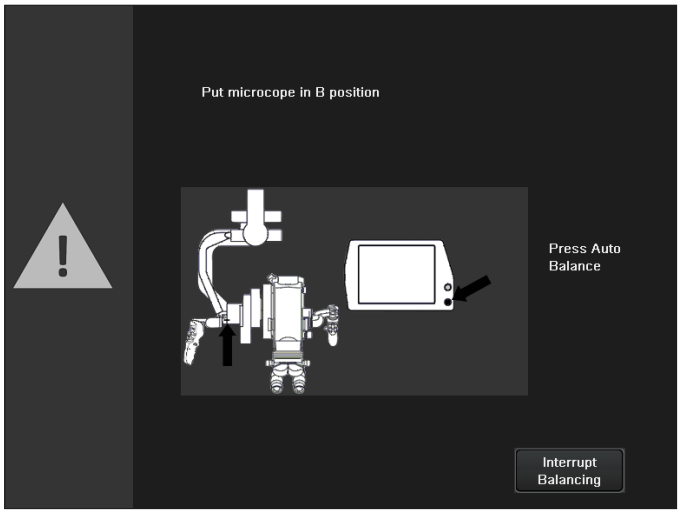


Balancing is completed when the acoustic signal no longer sounds and the autobalancing push-button is no longer flashing.
A dialog window indicates that balancing has been completed.



► Press the "Close" button or wait until the dialog window is closed automatically after 5 seconds.
► Check the balancing.
► Press the "All Brakes" button on the handle and position the microscope.
The microscope must remain fixed in any position.

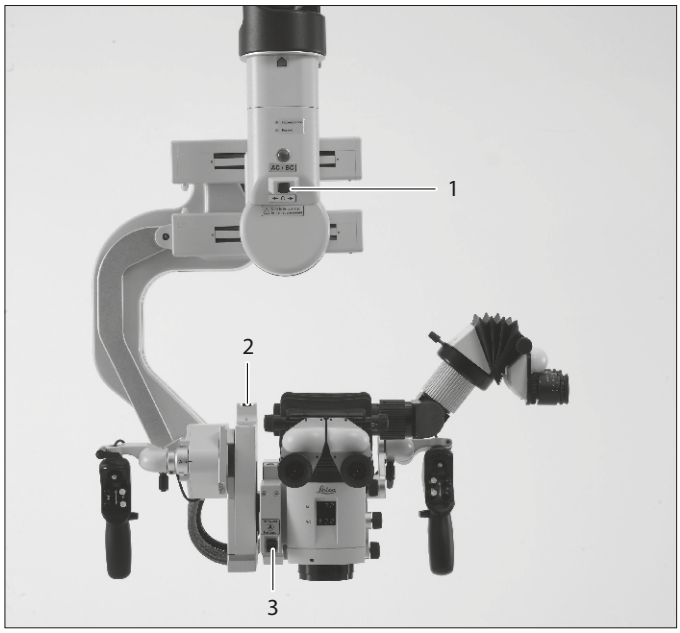
If the optics carrier is not oriented correctly, the following dialog window opens:



- ► Correct the orientation of the optics carrier (B-position).
- ► Press the autobalancing push-button.
  Autobalancing re-starts.

7.6.2 Manual balancing of the ARveo

For manual balancing, the axes can be moved manually using switches (1), (2) and (3).

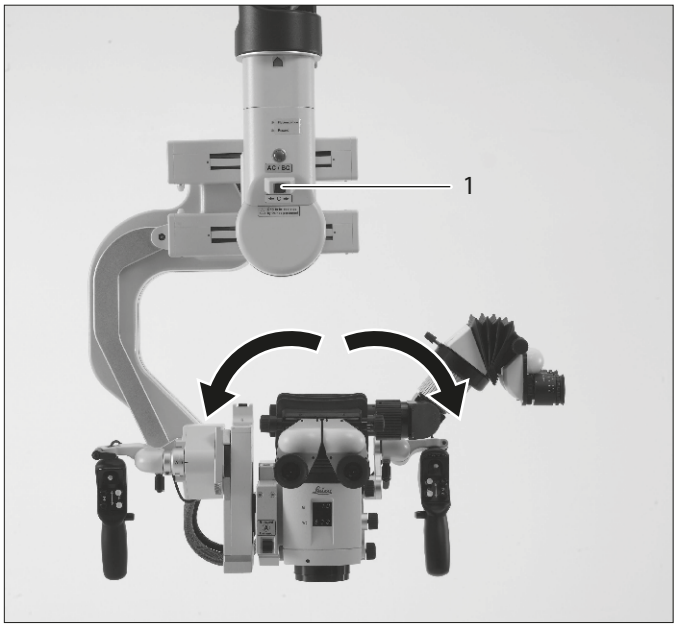


1 C direction
2 B direction
3 A direction

Make sure no accessories collide with the microscope during manual balancing.

- ► Check the balancing.
- ► Press the "All Brakes" button on the handle.

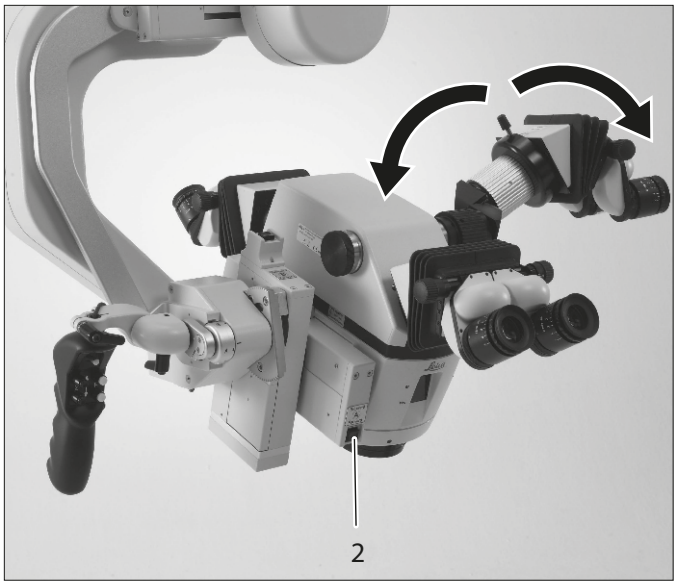
Optics carrier tilting to the right/left



- ► Move the C axis with switch (1) until the optics carrier is balanced.

Optics carrier tilting to the right	move switch to the left
Optics carrier tilting to the left	move switch to the right

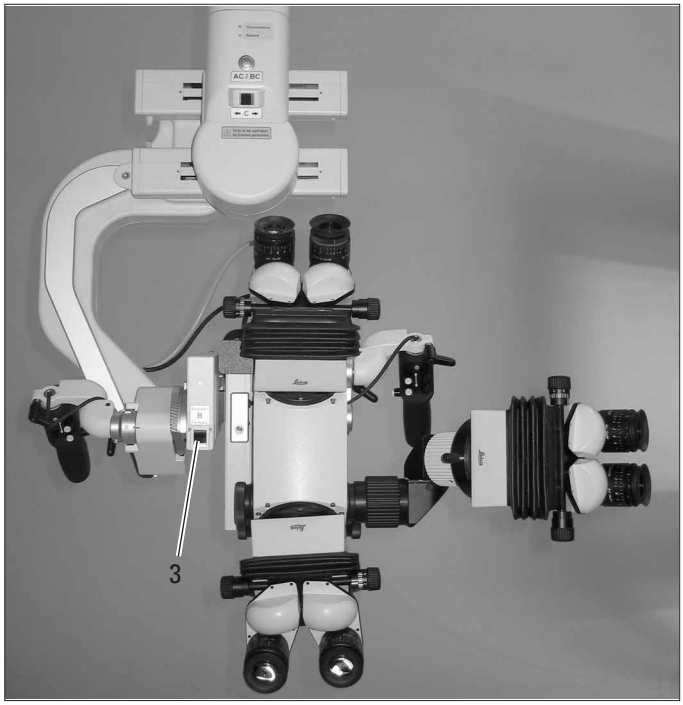
Optics carrier tilting back/forwards



- ► Move the A axis with switch (2) until the optics carrier is balanced.

Optics carrier tilting back	move A axis forwards
Optics carrier tilting forwards	move A axis back

Optics carrier tilting back/forwards in the B-position



► Move the B axis with switch (3) until the optics carrier is balanced.

Optics carrier tilting back	move B axis forwards
Optics carrier tilting forwards	move B axis back

If the microscope cannot be balanced manually, the weight and/or possition of the accessories is probably out of the allowed range.

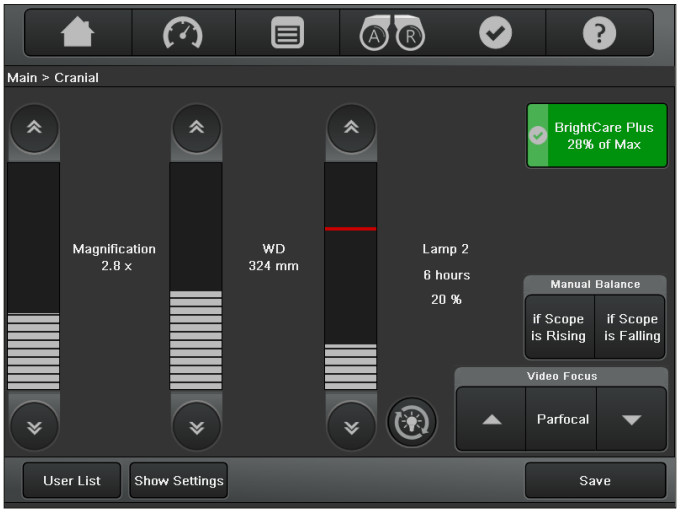
► Reduce or increase the weight to the permitted range and/or optimize the position of the side assistant.

7.6.3 Correcting the D-balancing manually

The internal weight (1) in the stand compensates for the weight of the surgical microscope and the installed accessories.

It may be necessary to correct the D-balancing after fitting a sterile drape on the microscope

► Correct the D-balancing of the stand with the "if Scope is Rising" and "if Scope is Falling" keys on the "Main" screen of the control unit.



Microscope is too heavy	touch "if Scope is Falling" key
Microscope is too light	ouch "if Scope is Rising" key

To balance the D axis when using accessories with different weights, the number of D axis weight disks can be adapted accordingly (see below).

7.6.4 Changing the weight disk on the D axis

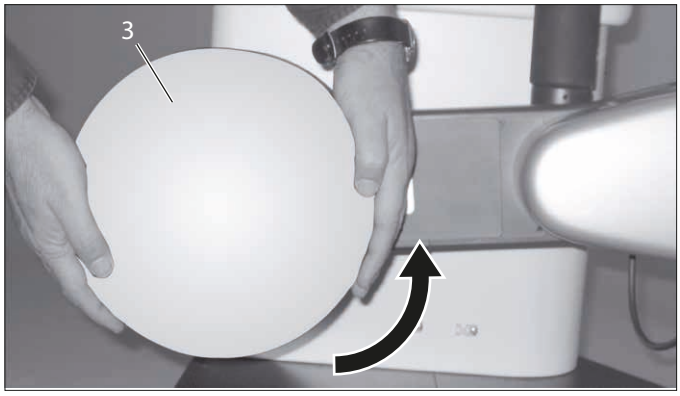
If the ARveo cannot balance the accessories in use, a weight disk must be added to or removed from the D axis.

CAUTION

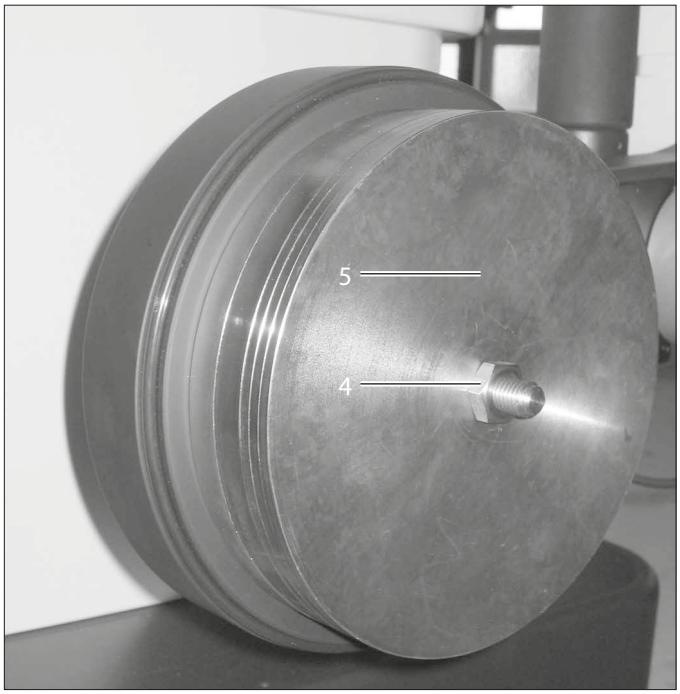
Danger of injury due to falling weight disk or cover.

- ► When changing the weight disk, make sure that your feet are not beneath the weight disk or the cover.

► Detach the cover (3) from the axis.



► Unscrew the hexagonal nut (4).



► Add or remove the disk (5).

Quantity D axis wheel counterweights		Load optics carrier	
Heavy	**Light**	**Min.**	**Max.**
2	0	6.7 kg	10.0 kg
2*	1*	7.3 kg	10.8 kg
2	3	8.6 kg	12.2 kg

* Standard configuration

► Screw on the hexagon nut (4).
► Re-attach the cover (3).

7.7 Positioning on the operating table

WARNING

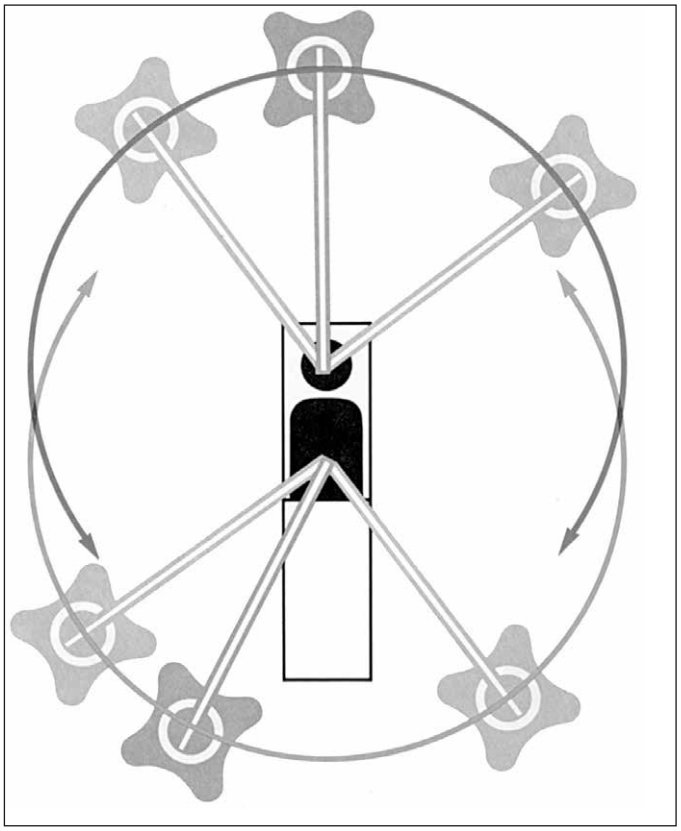
Risk of injury due to downward movement of the surgical microscope.

- ► Complete all preparations and adjustments to the stand before the operation.
- ► Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
- ► Balance the ARveo after re-equipping it.
- ► Do not release the brakes when the instrument is in an unbalanced state.
- ► Before re-equipping during the operation, first swing the microscope away from the operating field.
- ► Never carry out the intraoperative AC/BC balancing above the patient.

The ARveo can be positioned easily on the operating table and offers a variety of possibilities for operations on the head or spinal column.
The ARveo achieves this large range of positions through its very long and high arm system.

- ► Release the footbrakes (see page 22).
- ► Move the ARveo surgical microscope carefully over to the operating table by the handle and into the required position for the operation.

Positioning options



- ► Set the footbrake.
- ► Plug the footswitch into the stand and position it.
- ► Plug the power cable into the stand.
- ► Connect the equipotential bonding to the stand.

7.8 Attaching sterile controls and drape

WARNING

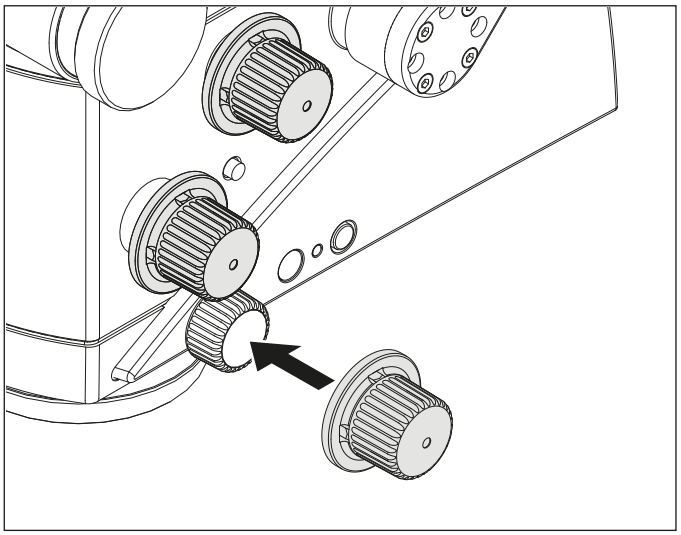
Risk of infection.

► Always use the ARveo surgical with sterile controls and a sterile drape.

7.8.1 Covers for rotary buttons

Use the covers also when you use sterile disposable drapes. The controls will be easier to grasp.

► Fit steam-sterilizable covers on the magnification, working distance and AutoIris manual override knobs.



► Attach steam-sterilizable covers to accessories as well (if present).

7.8.2 Cover for footswitch

Packaging the footswitch in a plastic bag protects it against dirt.

7.8.3 Sterile drape for stand

Only use the sterile Leica tested drapes specified in the Accessories section.

CAUTION

Risk of infection.

► Leave sufficient space around the stand to ensure that the sterile drape does not come into contact with non-sterile components.

CAUTION

Danger of injury due to falling counterweights.

► Before attaching the sterile drape, check the counterweights for correct seating.

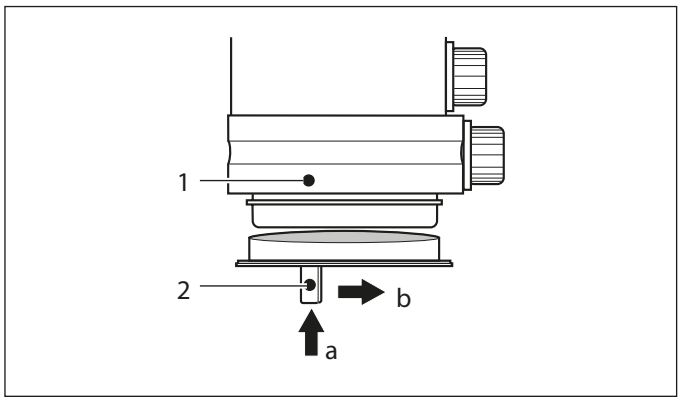
► Activate the "All Brakes" function on the handle and extend the arm system.
► Put on sterile gloves.
► Attach all the sterile controls.
► Unpack the sterile drape carefully and drape it over the Leica M530 surgical microscope as far as the arm system.
► Clamp the protective glass (optional) onto the objective.
► Do not attach the sterile drape too tightly with the provided ribbons. It must still be easy to move the instrument.
► Check the ease of movement of the instrument.

Follow the instructions provided by the manufacturer of the sterile drape.

Always use the drape with a protective glass.

7.8.4 Attaching the protective glass to the objective

► Place the sterilized protective glass on the optics carrier so that the markings on the Leica M530 (1) and on the protective glass (2) are aligned.



► Insert the protective glass upwards into the bayonet mount in direction (a).
► Turn the protective glass in direction (b) until it engages.

7.9 Function check

Refer to the checklist before operation on page 77.

8 Operation

8.1 Switching the microscope on

WARNING

Danger of fatal electrical shock.

- The ARveo surgical microscope may be connected to a grounded socket only.
- Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

WARNING

Danger of injury to the eyes due to possibly hazardous optical infrared and UV radiation.

- Do not look at the operating lamp.
- Minimize exposure to eyes or skin.
- Use appropriate shielding.

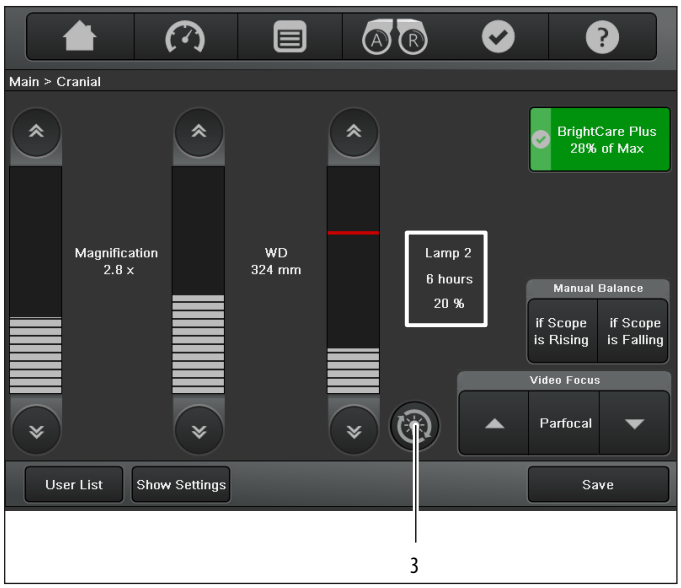
WARNING

Danger of burn injuries in otologic surgery.

- Use the lowest comfortable light intensity.
- Adjust the field of view to match the operating field.
- Irrigate the wound frequently.
- Cover the exposed parts of the pinna with a moist surgical sponge.

- Connect the microscope to a grounded socket.
- Do not position the microscope to make it difficult to operate the disconnection device, which is the mains plug.
- Switch on the microscope at the power switch (2) on the stand. After the surgical microscope is switched on, the settings of the last active user are loaded.
- Check the fiber optics cable connection to the optics carrier.
- Switch on the illumination with the key (1) on the control unit.

The main screen is displayed.



- Check both lamp hour counters by switching from lamp 1 to lamp 2 with button (3).
  To guarantee a good light performance the life time shall not exceed 500 hours.

8.2 Positioning the microscope

8.2.1 Coarse positioning

- ► Hold the microscope by both handles.
- ► Press the button for releasing all brakes and position the microscope.
- ► Release the brakes button.

Also refer to the "Release brakes" chapter on page 22.

CAUTION

Damage to the ARveo surgical microscope due to uncontrolled tilting.

- ► Hold the handle when releasing the brake.

8.2.2 Fine positioning

- ► Position the microscope with the XY drive using the joystick on the handle or the joystick on the footswitch.

You can change the speed at which the XY motors move on the "Speed" menu screen.
This value can be saved individually for each user (see page 44).

8.3 Adjusting the microscope

8.3.1 Adjusting the brightness

You can make the illumination brighter or darker using either the touch panel monitor, a hand/footswitch, or handle.

On the touch panel monitor in the "Main" menu screen

- ► Press the ⌃ or ⌄ button on the bar for adjusting the brightness of the illumination.

– or –

- ► Press the brightness adjustment bar directly.
  The brightness of the active main illumination changes.

- Clicking the ⌃ or ⌄ button changes the brightness value in increments of 1. Holding down the button with your finger changes the value in increments of 5.
- The start setting can be saved individually for each user (see page 46).
- The main illumination can only be switched on and off using the illumination push-button on the stand.
- The brightness setting is also visible when the illumination is off. However, the display bar will appear darker.

WARNING

Danger of injury to the eyes.
At a short focal distance, the light source of the illumination unit may possibly be too bright for the operating physician and the patient.

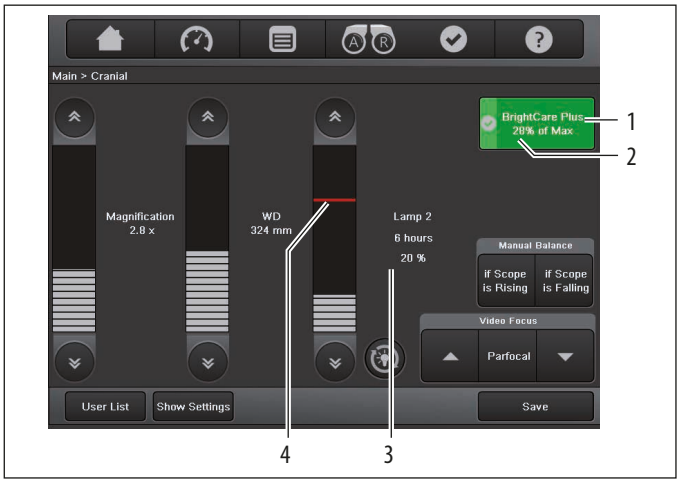
- ► Begin with the lower-intensity light source and slowly increase it until the operating physician has an optimally illuminated image.

On the handswitch/footswitch/handle

Depending on the assignment (see page 47), you can also increase and decrease the brightness of the main illuminator using two correspondingly assigned buttons on the handswitch/ footswitch/handle.

8.3.2 BrightCare Plus

BrightCare Plus is a safety function which automatically limits the maximum brightness depending on the working distance. Excessively bright light can, in combination with a short working distance, cause burns in patients.
The BrightCare Plus function is part of the "Main" menu screen.



1 BrightCare Plus button
green BrightCare Plus is enabled
yellow BrightCare Plus is switched off
2 Configured illumination condition for BrightCare Plus (configured brightness (4)/ max. configurable brightness (5) in %)
3 Percent value of the configured brightness
4 Red line for maximum configurable brightness with BrightCare Plus

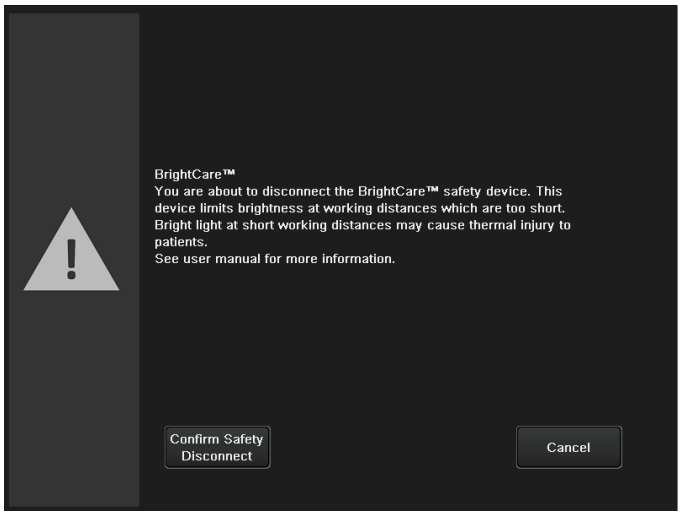
The red line on the brightness adjustment bar shows the maximum adjustable brightness for the current working distance.
The brightness cannot be set to a level beyond the red line.
When the working distance is reduced by too little at a set brightness, the brightness is reduced automatically.

It is advisable to begin with a low light output and increase the light intensity until an optimum level of illumination is achieved.

When shipped from the factory, the "BrightCare Plus" safety function is activated for all users.

Deactivating BrightCare Plus

Deactivating BrightCare Plus is only possible if this function is enabled in the service menu.
If enabled, by clicking the "BrightCare plus" button a dialog window opens in which you have to confirm that you want to deactivate the safety function.



When the "BrightCare plus" safety function is deactivated, the color of the "BrightCare plus" button changes from green to yellow.

WARNING

Danger of injury to the eyes.
At a short focal distance, the light source of the illumination unit may possibly be too bright for the operating physician and the patient.

- ► Begin with the lower-intensity light source and slowly increase it until the operating physician has an optimally illuminated image.

The status of the "BrightCare Plus" safety function can only be changed permanently in the "User settings" menu. A change in status during operational procedures will not be stored when the user settings are saved with "Save" or "Save as".

Reactivating the "BrightCare Plus" safety function

- ► Click the yellow "BrightCare Plus" button again.
"BrightCare Plus" is now activated and the button is again lit green.

8.3.3 Changing lamps

If the xenon primary illuminator fails, you can use the button (1) on the "Main" menu screen to switch to the auxiliary illuminator.

- ▶ Replace the defective lamp at the next opportunity.
- ▶ Never begin an operation with only one functioning xenon lamp.

A dialog window informs you when the xenon lamp is losing luminosity and is no longer sufficient either for blue light (FL400 application only) or for white light (all other applications). We recommend that you keep a replacement lamp handy.

Changing over manually to backup illumination (emergency use only)

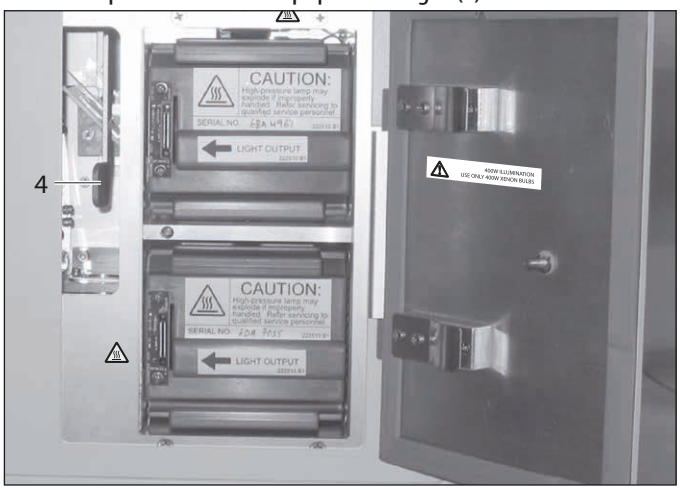
- ▶ Open the screw knob (3) and open the access door (2) for lamp inserts on the illumination unit.
  The push-button (1) flashes orange.

CAUTION

Hot lamp insert can cause burns.

- ▶ Do not touch the hot lamp insert.

- ▶ Push up or down the lamp quick changer (4).



8.3.4 Setting the illumination field diameter

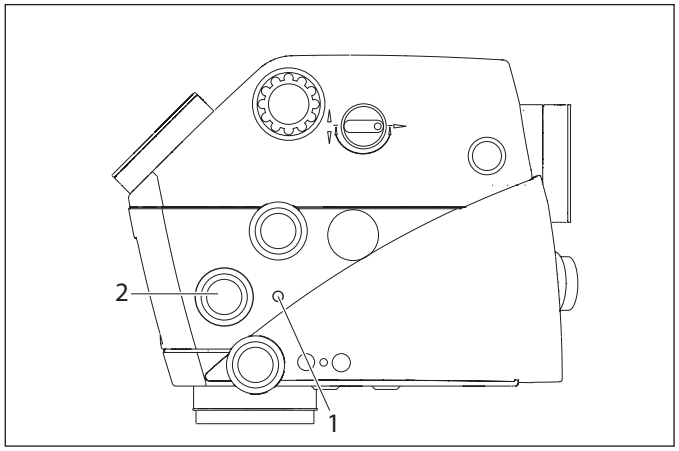
CAUTION

If the field diameter is greater than the field of view and the light intensity is too high, uncontrolled tissue heating may occur outside of the area visible through the microscope.

► Do not set the light intensity too high.

Thanks to AutoIris, the field diameter is automatically adapted to the size of the field of view at the Leica M530 Optics carrier.

► To adjust the illumination field diameter manually, use rotary button (2).
Automatic adjustment AutoIris is deactivated.
► To reactivate AutoIris press the Reset button (1).



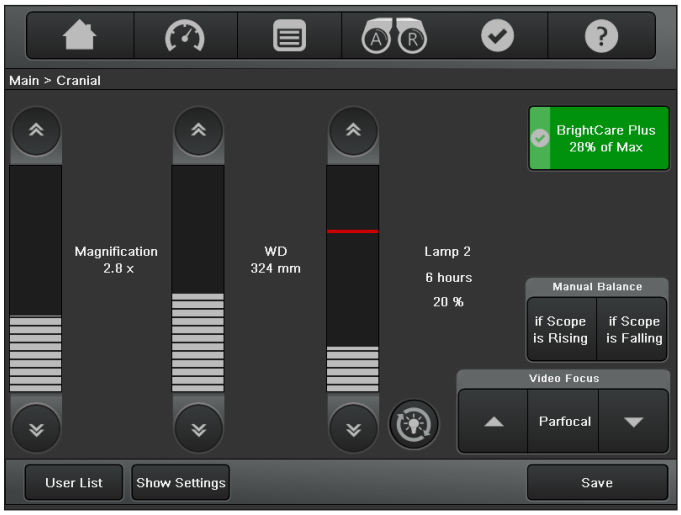
If the illumination field diameter is blocked at a high light intensity in a high magnification setting, and cannot be adjusted automatically or manually, then the light intensity must be reduced in order to protect the tissue.

If the field diameter is locked in a small position and cannot be adjusted either automatically or manually, you can use an OR lamp to better illuminate a large field of view (small magnification position).

8.3.5 Adjusting the magnification (zoom)

You can adjust the magnification using a footswitch/handswitch or the "Magnification" adjustment bar on the "Main" menu screen of the control unit.

On the "Main" menu screen



► Press the ⌃⌃ or ⌄⌄ button on the bar for adjusting the magnification.
– or –
► Press the magnification adjustment bar directly.
The magnification changes.

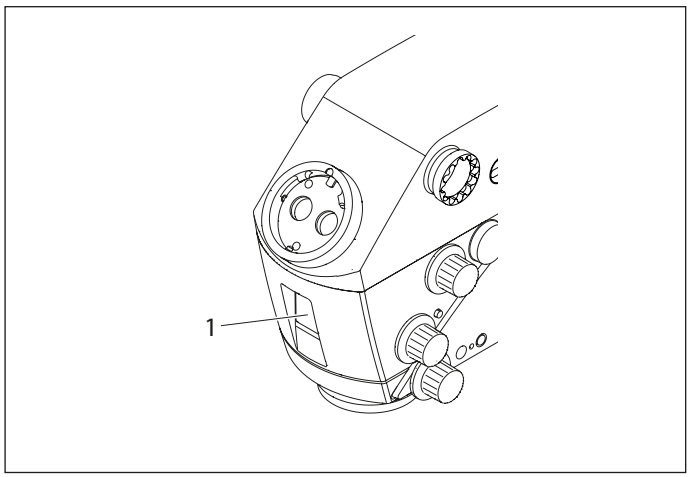
- Clicking the ⌃⌃ or ⌄⌄ button changes the magnification value in increments of 1. Holding down the button with your finger changes the value in increments of 5.
- You can adjust the magnification motor speed in the "Speed" menu.
- These values can be saved individually for each user (see page 44).

WARNING

Danger to the patient due to failure of the magnification motor.

► If the magnification motor fails, adjust the magnification manually.

You can read the currently set magnification on the display (1) on the Leica M530 Optics carrier.



Manually adjusting the magnification (zoom)

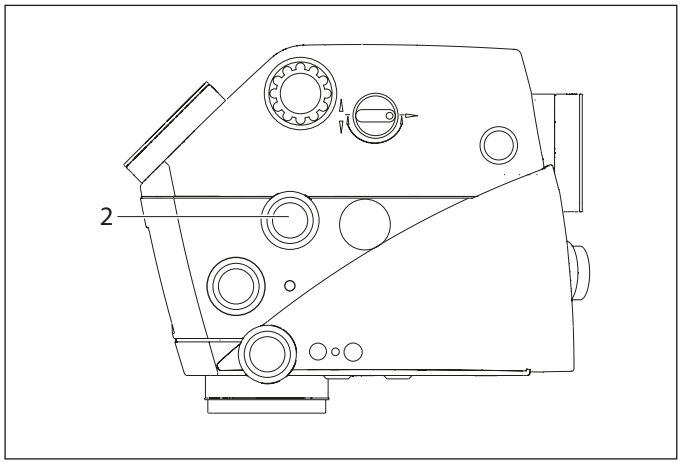
NOTE

Destruction of the magnification motor.

- ► Only adjust the magnification manually if the magnification motor is defective.

If the magnification motor fails, the magnification can be manually adjusted using the rotary knob (2).

- ► Push in rotary button (2).
- ► Set the desired magnification by turning the knob.



8.3.6 Setting the working distance (WD, focus)

WARNING

Danger of serious damage to tissue due to incorrect working distance.

- ► When using lasers, always set the working distance of the microscope to laser distance and lock the microscope in position.
- ► Do not adjust the rotary button for manual setting of the working distance while using the laser.

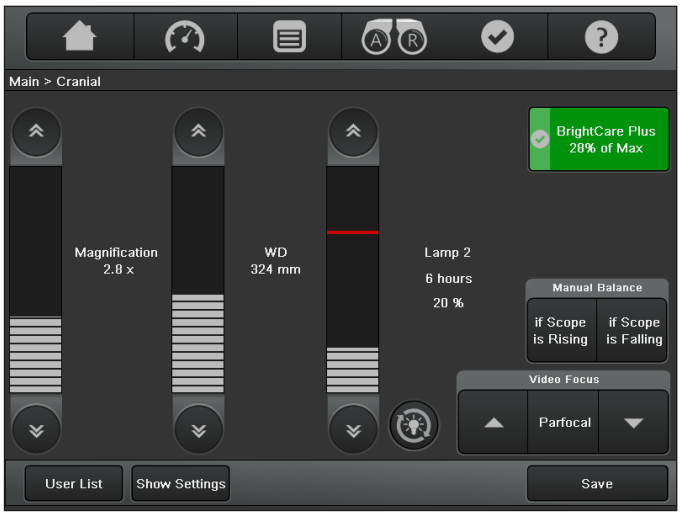
WARNING

Danger of injury to the eyes due to laser radiation.

- ► Never point the laser directly or indirectly via reflecting surfaces to the eyes.
- ► Never point the laser to the eyes of the patient.
- ► Do not look into the laser beam.

You can adjust the working distance using the footswitch/ handswitch or the "working distance" adjustment bar on the "Main" menu screen of the control unit.

On the touch panel monitor in the "Main" menu screen



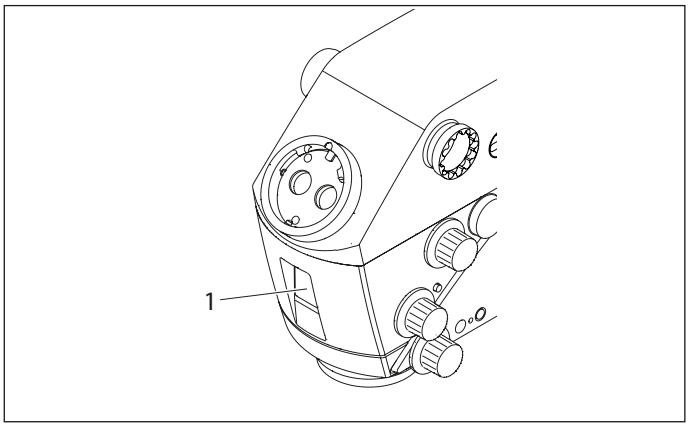
- ► Press the ⏫ or ⏬ button on the bar for adjusting the working distance.

– or –

- ► Press the working distance adjustment bar directly. The working distance changes.

- Clicking the ⌃⌃ or ⌄⌄ button changes the working distance in increments of 1. Holding down the button with your finger changes the value in increments of 5.
- You can adjust the working distance motor speed in the "Speed" menu.
- These values can be saved individually for each user (see page 46).
- You can return the working distance motor to the working distance saved for the current user using the "WD Reset" button.

You can read the currently set working distance on the "Main" screen of the control unit or read it on the display (1) on the Leica M530 Optics carrier.



WARNING

Danger to the patient due to failure of the working distance motor.

- ► If the working distance motor fails, adjust the working distance manually.

Setting the working distance manually

WARNING

Danger of serious damage to tissue due to incorrect working distance.

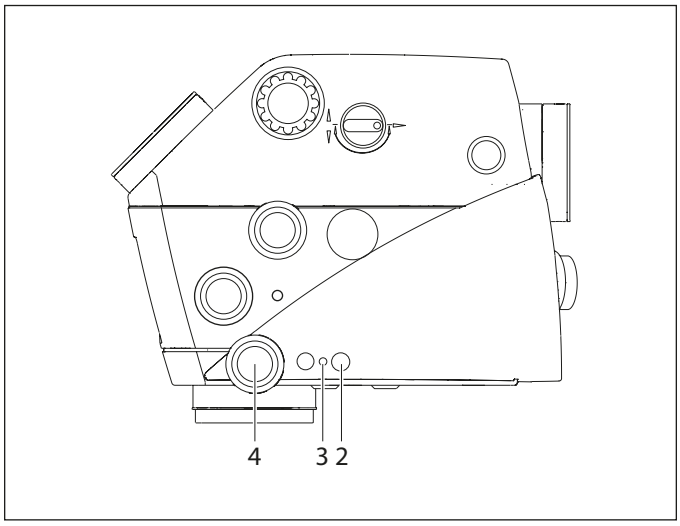
- ► When using lasers, always set the working distance of the microscope to laser distance and lock the microscope in position.
- ► Do not adjust the rotary button for manual setting of the working distance while using the laser.

NOTE

Destruction of the working distance motor.

- ► Only adjust the working distance manually if the working distance motor is defective.

If the working distance motor fails, working distance can be manually adjusted using the rotary knob (4).



- ► Turn rotary button (4) and set the working distance as required.

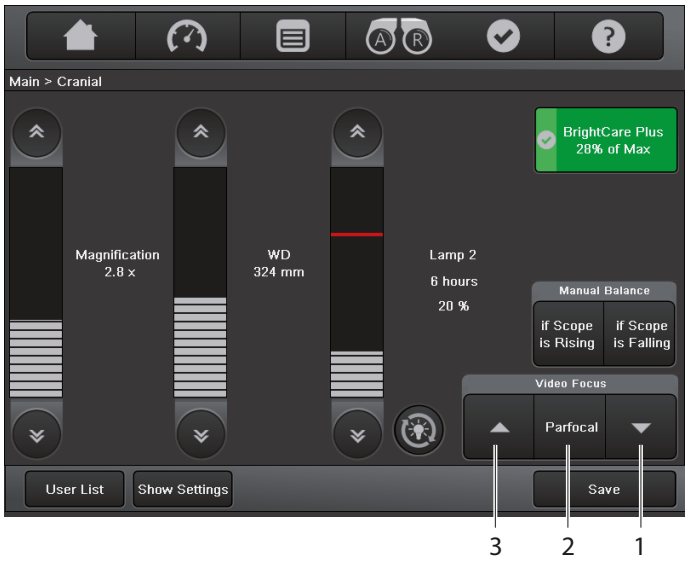
Locking/releasing the working distance

It is necessary to lock the working distance when working at a fixed distanc
e or when using a laser.

- ► Press key (2).
  The yellow LED (3) turns on and the working distance is locked.
- ► Press key (2) again.
  The yellow LED (3) turns off and the working distance is released.

8.3.7 Adjusting the video focus (optional)

The Leica FL800 ULT and ULT530 and as well GLOW800 offer fine focusing and parfocality reset of the video focus.



- The video focus can be adapted to your needs by pressing the focus button up (3) or/and down (1). This command can be given to the GUI and from the handle, if defined.

Focus adjustment operates in both directions with an endless circular movement.

The video fine focus can be re-adjusted to parfocality position by pressing the parfocality button (2). The video focal plane will then be aligned for all observers with zero diopters respectively with correct individual diopter settings. This command can be as well given on the GUI and from the handle, if defined.

8.4 Transport position

- Press the "All Brakes" button and move the ARveo into the transport position.

NOTE

- Make sure that the video monitor does not collide with the horizontal arm and the vertical arm of the stand.

- Shut down the system according to section 8.5.
- Unplug and secure the power cable.
- If present, store the footswitch on the stand.

8.5 Shutting down the surgical microscope

- If present, turn off the recording system according to the manufacturer's instructions.
- Switch off the light at the light switch.
- Bring the surgical microscope into the transport position.
- Switch off the surgical microscope at the power switch.

9 Control unit with touch panel

NOTE

Damage to the touch panel.

- ► Operate the touch panel using your fingers only.
  Never use hard, sharp or pointy objects made out of wood, metal or plastic.
- ► Never clean the touch panel using cleaners that contain abrasive substances. These substances can scratch the surface and cause it to be become dull.

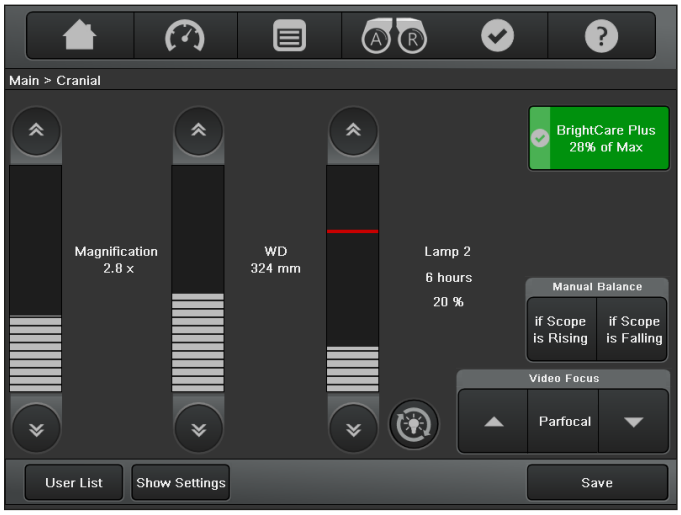
9.1 Menu structure

1 Quick access to the screens "Main", "Speed", "Menu" "DIC" and "Help"
2 Status line
3 Display range
4 Dynamic button bar
5 Warning messages

In operational mode, the status line displays the current user and specifies the current location in the menu at all times.

9.2 Selecting users

In the "Main" and "Speed" menu screens, the two buttons "User List" and "Show Settings" appear in the dynamic button bar at all times.



9.2.1 User list

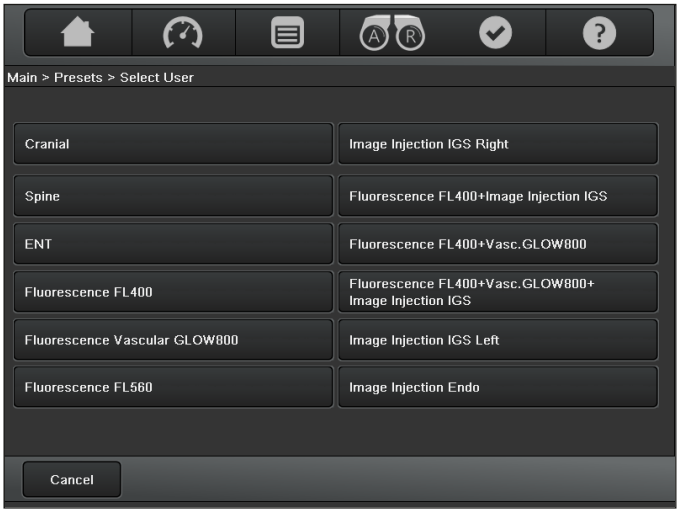
The "User List" opens a two-page user list from which you can select one of up to thirty users that can be saved.

- ► Click the "1-15" or "16-30" button to switch between screens.
- ► Select a user.
  The "Select" button is shown.
- ► Click "Select".
  The user settings are loaded.

- When the user list is open, it can be edited at any time.
- Before each operation, make sure that your desired user is selected and familiarize yourself with the assignment of the handles and the optional footswitch (if used).

9.2.2 Presets

You can find a list of default users preset by Leica for the most common types of operation under "Presets".

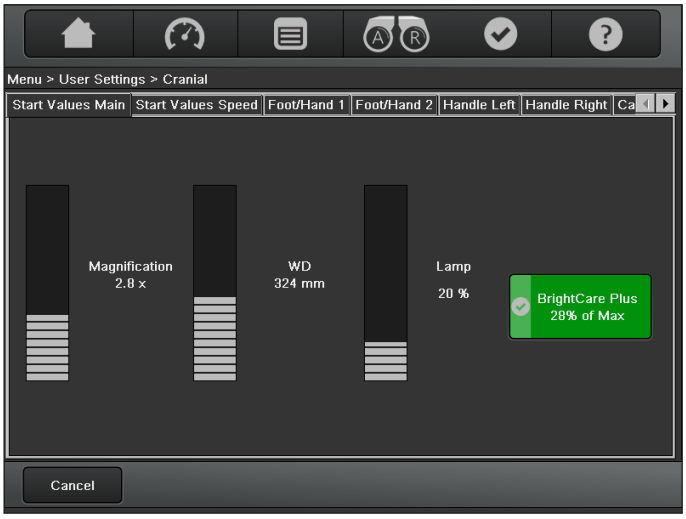


- ► Click one of the default users, then click "Select".
  The Leica M530 surgical microscope is ready to operate straight away.

- You can adapt and save the settings of these default users as required (see page 44).
- You can click the "Show Settings" button at any time to see an overview of the user settings of the current user.

9.2.3 Show Settings

- ► Press the "Show Settings" button in the dynamic button bar to see an overview of the user settings of the current user.



9.3 Menu – User Settings

You can configure user settings in this menu.

► Click the "Menu" button and select "User Settings".

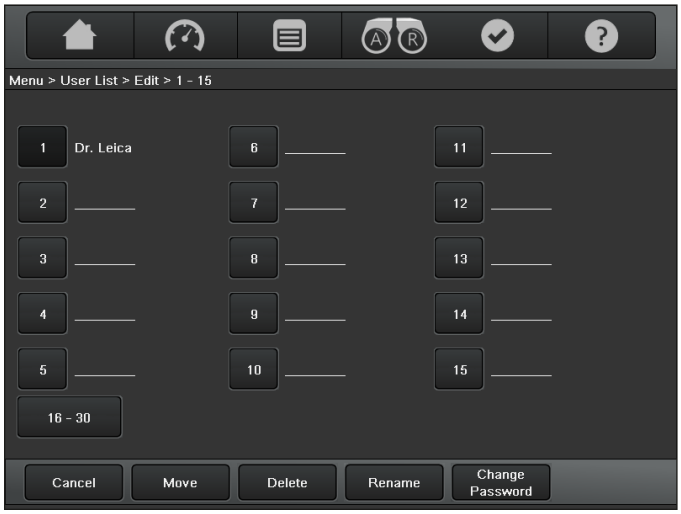
The following screen is displayed:

"Load"	Loads the settings of an existing user from the user list for modifying.
"New User"	Opens a new user with "blank" settings.
"New (Preset)"	Opens the "Preset" screen for selecting a default user in order to create a new user with the settings of the desired preset and to load or modify the user's settings.
"Edit User List"	Allows to rename, to move or to delete users.

- You can also add a user from the operational menu.
- If you want to keep the current settings, you can save them by clicking the "Save" button (which appears as soon as the basic settings of the current users have been changed), either for the current user ("Save") or under a new user name ("Save as New").

Editing the user list

Various functions are available in the user list depending on the situation.



► Select the user.
The available functions are displayed in the dynamic button line:

"Move"	Moves the selected user to another available location of your choosing.
"Delete"	Deletes the selected user.
"Rename"	Renames an existing user. The user's settings are not changed.
"Change Password"	Changes the password.

CAUTION

Danger to the patient due to changes in the user settings.

► Never change the configuration settings or edit the user list during an operation.

9.3.1 User Setting Protection

To avoid unauthorized or accidental changes of user settings, each user setting can be protected by a password/PIN. This keeps the working parameters identical each time you load a protected user setting. Changes can be done during the application but will not be stored unless saved by pressing "Save" and choosing either the "Save as current" or "Save as new" option, using the correct password/PIN or by creating a new user and password/PIN combination respectively.

Saving and protecting the user settings is done in two ways:

As a current user setting

You will receive a prompt for the password/PIN.

► If a password/PIN was defined save the changes of the user settings with entering the correct password/PIN.

If it is incorrect the system will go back to "Start values main".

► Choose "Save as current" and enter the password/PIN again.

If no password/PIN was defined, you can define a password/PIN (4-10 characters).

► Press "OK" for re-entering and confirmation.

If the re-entered password/PIN does not match the enter/re-enter process has to be repeated.

If no password/PIN should be defined, you can exit the procedure by pressing "Skip" or before re-entering with "Cancel".

As a new user setting

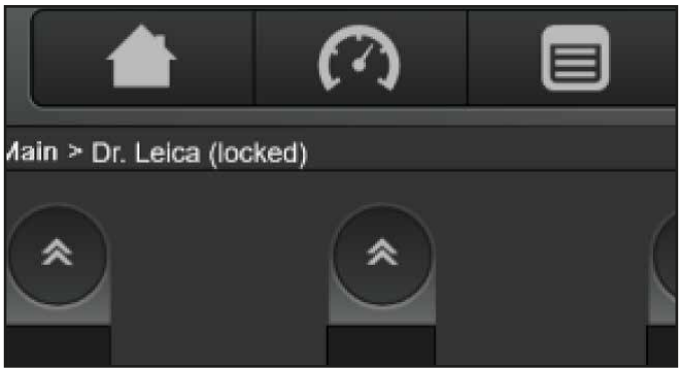
You will receive a screen message and a prompt for the password/PIN after entering the name of the user setting. If the settings should be protected:

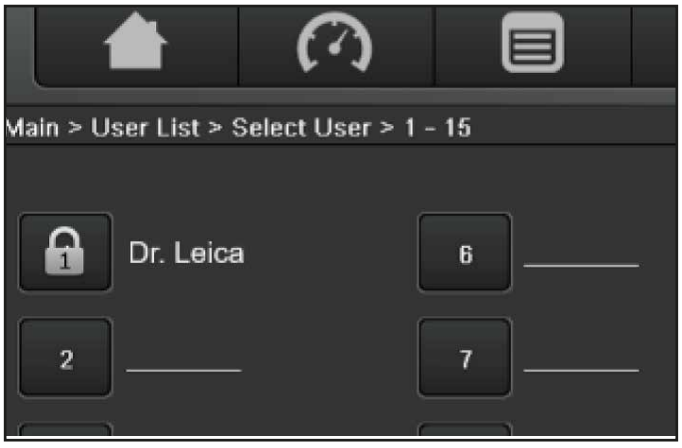
► Enter a password/PIN (4-10 characters) and press "OK" for re-entering and confirmation.

If no password/PIN should be defined you can exit the procedure by pressing "Skip" or before re-entering with "Cancel".

If the re-entered password/PIN does not match the enter/re-enter process has to be repeated.

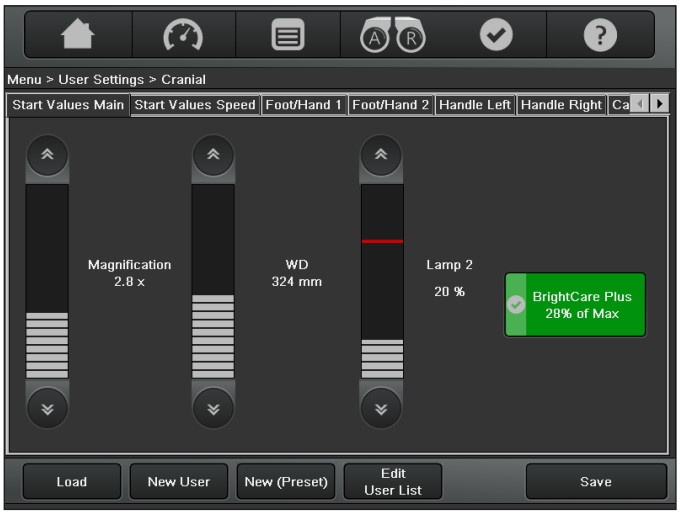
The protection of a user setting by a password/PIN is indicated by "(locked)" right after the user setting name on the GUI main page or by a lock icon in front of the user setting name in the Select User page.





9.3.2 Setting the "Main" start values

For the selected user you can set the start values for the illuminator, working distance and magnification on this screen.



- Clicking the ⌃ or ⌄ key changes the values in increments of one. Holding down the button with your finger changes the value in increments of five.
- You can also set the desired value by directly clicking the bars.
- On the "Main" user settings screen you can set the status of the BrightCare Plus safety function for the selected user.
- On the "Main" user settings screen you can permanently save the default settings for working distance Reset. If "WD Reset" is activated, the working distance motor automatically moves to the working distance saved for each user in the user settings when "All Brakes" are released. This function is deactivated in the factory default configuration.

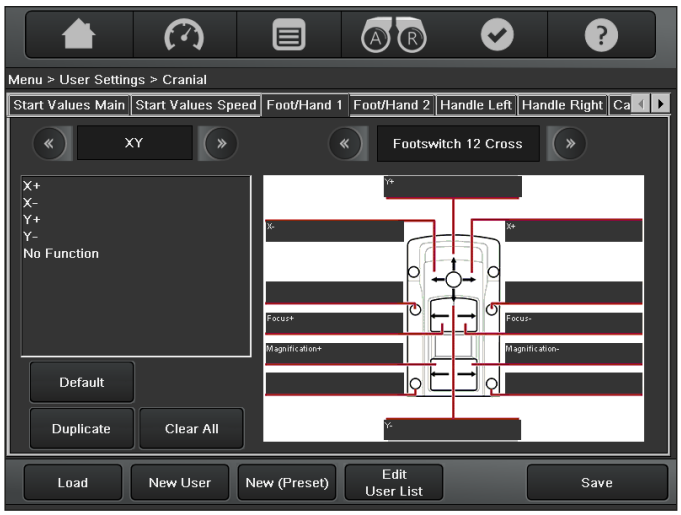
9.3.3 Setting the "Speed" start values

For the selected user you can set the start values for the travel speed of the magnification, working distance and XY motors on this screen.

- Clicking the ⌃ or ⌄ key changes the values in increments of one. Holding down the button with your finger changes the value in increments of five.
- You can also set the desired value by directly clicking the bars.
- On the "Speed" menu screen you can also select the desired brake combination "Focus Lock" or "XYZ Free" for the handle function "Selected Brakes".
- Activate the desired brake combination "Focus Lock" or "XYZ Free" by clicking the relevant button.
  The button for the preselected brake combination lights up green.
- Clicking the "WD Reset" button activates/deactivates the "WD Reset" function and the color of the button changes to green (activated) / gray (deactivated).

9.3.4 Footswitch/handswitch assignment (Foot/Hand 1 and Foot/Hand 2)

Here, you can configure individual settings for each user for your optional footswitch/handswitch.



The numbering of Foot/Hand 1 and Foot/Hand 2 is according to the terminal assignment, see page 17.

- ► First select a Foot/Hand switch.
- ► In the right selection field, select the foot-/handswitch you are using.
- ► You can scroll forwards or backwards in the list by clicking the arrowheads.
- ► You can also connect the optional 6-function footswitch to the ARveo. The 6 available switches work similar to those of the currently selected 12 or 16-function footswitch.
- ► Click the "Default" button.
  The default settings are assigned to the selected footswitch/handswitch.
- ► You can then modify these settings as you like.
  Clicking the "Clear All" button clears the assignments for all keys.

Configuring individual keys

- ► In the right selection field, select the foot-/handswitch you are using.
- ► You can scroll forwards or backwards in the list by clicking the arrowheads.
- ► In the left selection field, select the function group with the desired functions.
- ► You can scroll forwards or backwards in the list by clicking the arrowheads.
- ► Select the desired function.
- ► Click the caption of the desired key to assign the selected function to it.

Overview of function groups

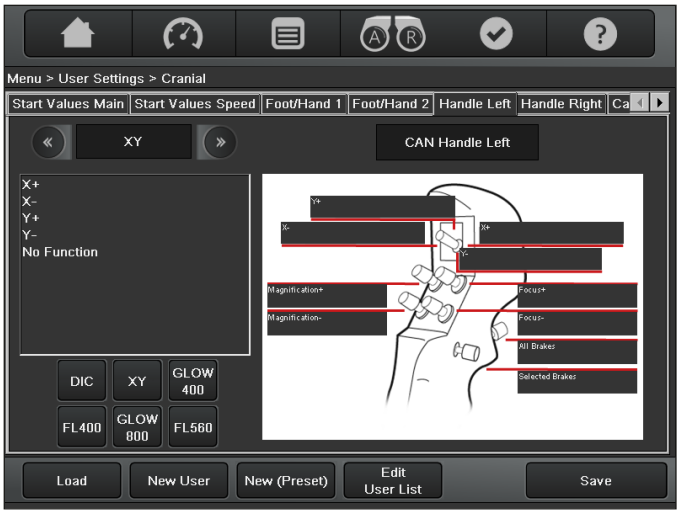
The possible configuration is divided into the following function groups:

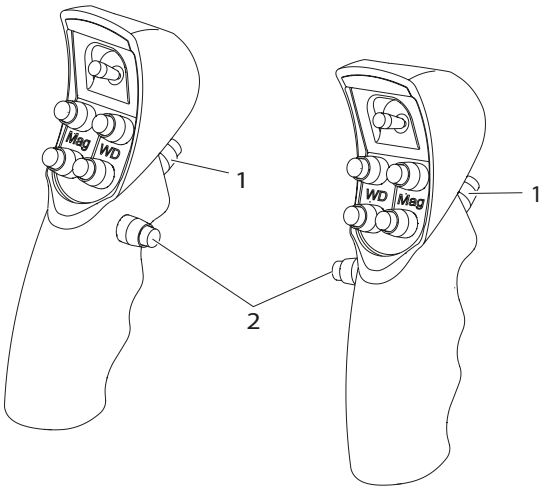
- Drive
- Extra
- Illumination
- XY
- Fluorescence
- DIC/IGS

- ► You can change the status of a function with the "Toggle" function (e.g., on/off). The "Pulse" function continuously changes the status (such as increasing the brightness).
- ► With the "XY Complete" function, you can assign all four functions of the joystick simultaneously.
- ► To delete an assignment which you do not want, select the "No Function" element - which can be found in all function groups - and assign it to the key in question.
- ► If you are creating only one footswitch/handswitch configuration for one user, we recommend duplicating it to the second footswitch/handswitch input by pressing the "Duplicate" button.
  This ensures that your footswitch/handswitch functions the way you want it to, regardless of which input it is plugged into.

9.3.5 Handle assignment (Handle Left / Handle Right)

On the two handle assignment screens, you can assign up to nine functions of your choice to the left and right handles.

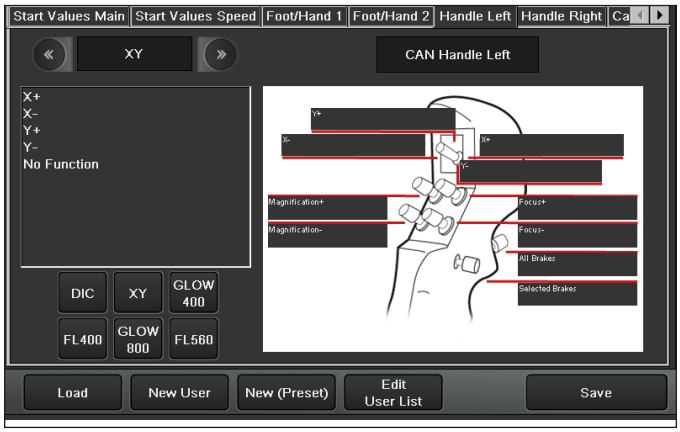




The "All Brakes" function is always assigned to the rear switch (1) for both handles, and can neither be overwritten nor deleted.

- ► In the left selection field, select the function group with the desired functions.
  You can scroll forwards or backwards in the list by clicking the arrowheads.
- ► Select the desired function.
- ► Click a free caption of the desired key to assign the selected function to it.
  The inner switch (2) to which "Selected Brakes" is pre-assigned can be freely assigned, as required.
  You can also assign one of the five defaults "X/Y", "FL400", "DIC", "GLOW800" or "FL560" completely to each handle.

Default handle assignment X/Y



9.3.6 Leica Image Injection settings

For more Information see the CaptiView user manual.

9.3.7 Leica SpeedSpot Settings

During FL400 mode SpeedSpot is per default deactivated.

SpeedSpot Function

► Select from the following:
Active, Not active

SpeedSpot Trigger

Leica SpeedSpot can automatically be switched on and off depending on the following conditions:

Trigger	Activating condition	Deactivating condition	Default setting
Brakes	Brakes released	Brakes closed	On
Focus	Movement of working distance motor	Working distance motor stopped	On
XY	Movement of XY motors	XY motors stopped	Off

SpeedSpot Delay

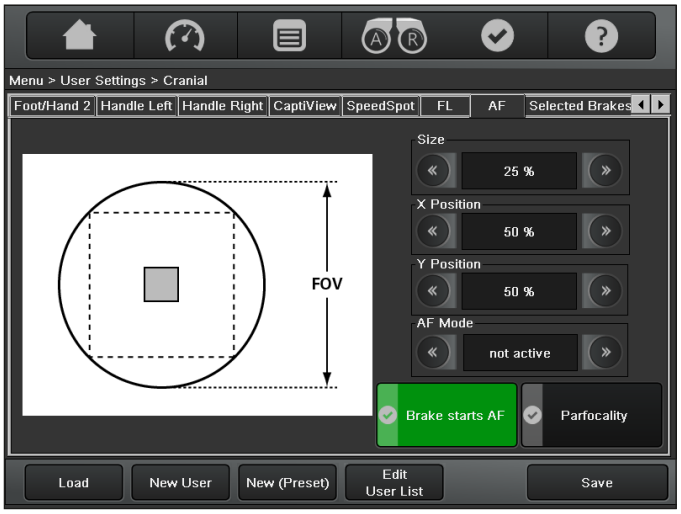
For switching off Leica SpeedSpot a timeout can be configurated from 0 to 10 seconds.
Default timeout is 3 seconds.
0 seconds means that the function is switched off immediately.

9.3.8 Acessories settings

The Accessories settings are described in the corresponding user manuals.

9.3.9 AutoFocus Settings

- AutoFocus is an optional function and can be ordered additionally.
- AutoFocus is **not** available in all countries.
- AutoFocus is **not** available with FL800 mode and FL400 mode.



The small grey field in the middle represents the AutoFocus window.

Size

► Adjust the size of the AutoFocus window
Possible settings: 10 % to 100 %
Default setting: 25 %

X Position / Y Position

► Adjust the X and Y position of the AutoFocus window
Possible settings: 0 % to 100 %
Default setting: 50 % each, so the AutoFocus window is exactly in the middle

AF Mode

► Select from the following:
Active, Not active

Break starts AF

When activated, releasing the breaks starts the AutoFocus function.

Parfocality

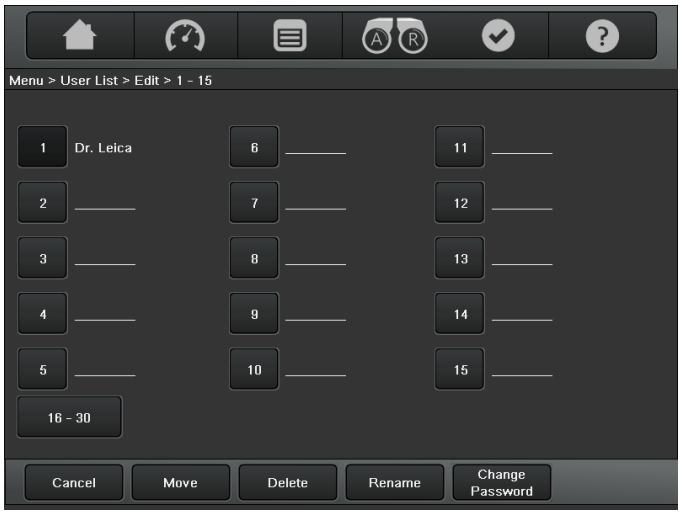
- When activated, the objective is automatically brought into working distance at maximum magnification.
- When deactivated, the objective is automatically brought into working distance at the current magnification settings.

AutoFocus functions can be operated via footswitch/ handswitch/handle. AutoFocus settings are part of the function group "Extra", see page 47.

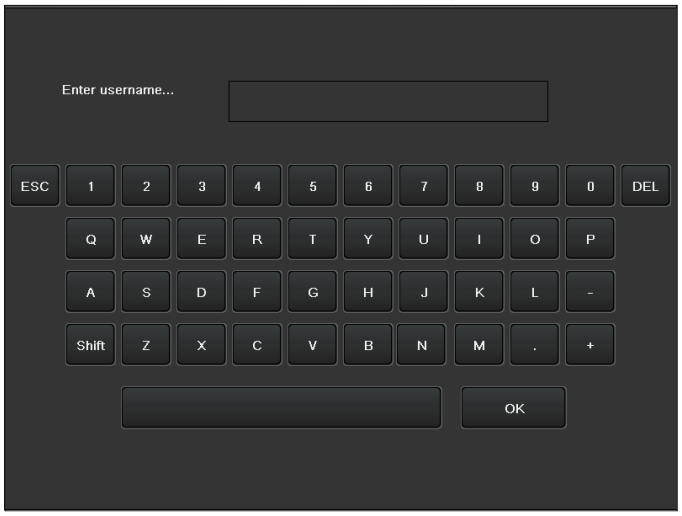
9.3.10 Saving user settings

► Click the "Save" button.
► Select an available location in the user list where you want to store your user.

If you like, you can edit the user list first.



► Enter the desired user name using the keyboard.



► Click the "Save" button to save the user at the desired location under the name you have entered.

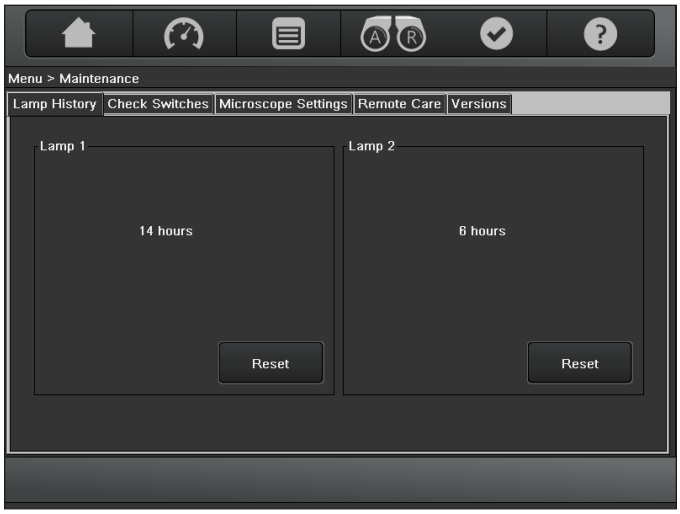
9.4 Menu – Maintenance menu

► Press the Menu button and select "Maintenance".

The Maintenance menu offers the following screens:
- Lamp History
- Check Switches
- Microscope Settings

9.4.1 Maintenance –> Lamp History

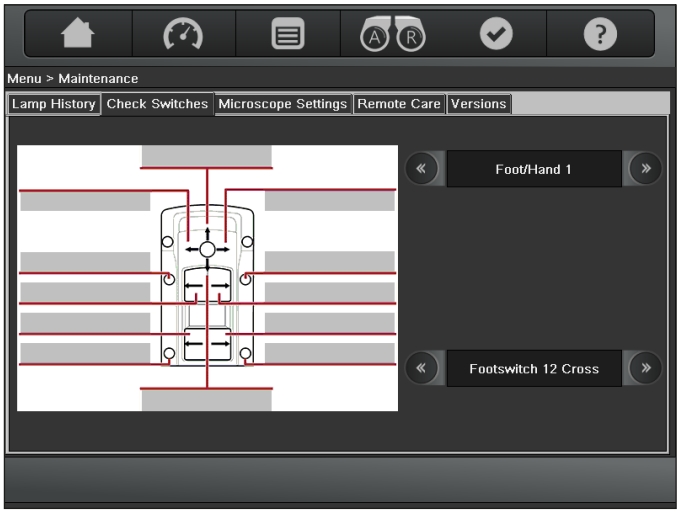
On this screen, you can view and reset the operating hours of xenon lamp 1 and xenon lamp 2.



Whenever you replace a bulb, reset the bulb's hour meter to 0 by double-clicking the "Reset" button.
A dialog window informs you when the xenon lamp is losing luminosity and is no longer sufficient either for blue light (FL400 application only) or for white light (all other applications).

9.4.2 Maintenance –> Check Switches

On this screen, you can test your handles and the optional foot/handswitch.



Top right selection field

In this field you can select the connection you are using or the desired handle.

- ► Scroll forwards or backwards in the list by clicking the arrowheads to select the connection.

Bottom right selection field

In this field you can select the foot-/handswitch you want to check.

- ► Scroll forwards or backwards in the list by clicking the arrowheads to select the foot-/handswitch.
- ► Press all of the keys, one after the other, of the foot-/handswitch or handle you want to test.
  If the key you have pressed is functioning properly, a green dot appears on it on the display. The comment "Tested" appears in the caption field of the key.

9.4.3 Maintenance –> Microscope Settings

On this screen you can configure the accessories you are using. This ensures that the correct magnification is shown on the "Main" menu page.

Select Surgeon Tube

In this field you can enter the binocular tube currently being used by the surgeon.

- ► Scroll forwards or backwards in the list by clicking the arrowheads.

Select Eyepiece

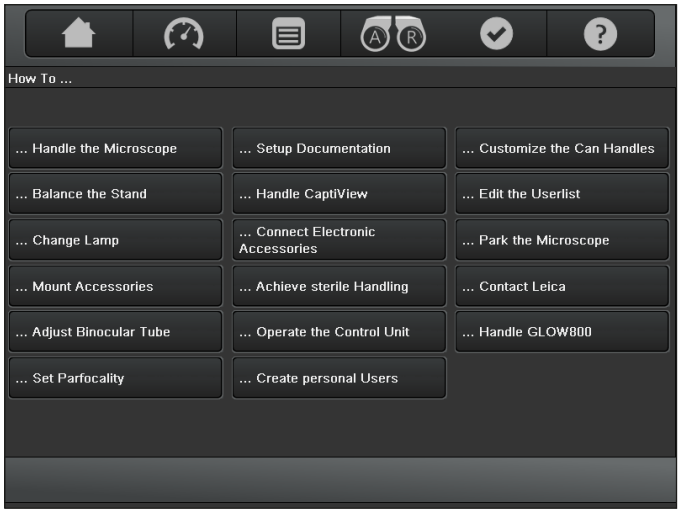
In this field you can select the magnification of the eyepieces being used by the surgeon.

- ► Scroll forwards or backwards in the list by clicking the arrowheads.

> **!** If you do not make a selection, the magnification is calculated for the standard equipment: binocular tube 30°–150° and eyepiece with 10× magnification.

9.5 Menu – "How to..."

This screen displays, in short form, user instructions for operating your surgical microscope.



► Press the button for the topic desired.
Detailed information "How to ..." is displayed.

The "Help" button in the static menu bar provides access to the "How To..." screens at all times.

9.6 Menu – "Service"

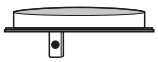
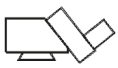
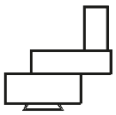
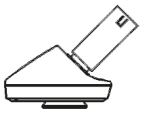
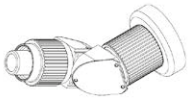
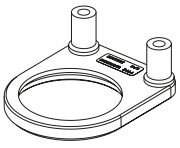
This area is password-protected.

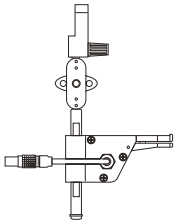
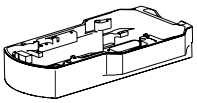
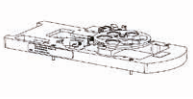
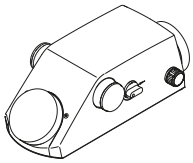
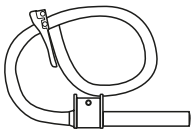
Before starting the service menu, end the recording procedure on the documentation system. Otherwise data could be lost.

10 Accessories

A comprehensive range of accessories enables the ARveo surgical microscope to be matched to the requirements of the task in hand. Your Leica representative will be pleased to help you select the appropriate accessories.

10.1 Devices and accessories manufactured by Leica

Picture	Devices and accessories
	Protective glass
	Binocular tube var. 0° - 180°, T, Type II
	Binocular tube var. 30° - 150°, T, Type II L
	Inclined binocular tube, T, Type II
	Straight binocular tube, T, Type II
	Inclined binocular tube 45°, Type II
	Eyepiece 10× Eyepiece 12.5× Eyepiece 8.3×
	Magnification multiplier
	Stereo attachment second observer
	Universal Laser Adapter

Picture	Devices and accessories
	Mouth Switch
	CaptiView
	Leica FL400, Leica FL560
	Observation filter unit for Leica M530 with ULT • Leica FL560 for M530 • Leica FL400 for M530 • Leica FL400/FL560 for M530 • Leica FL800 ULT • GLOW800
	SMARS Surgical Microscope Air Removal System

! See also the corresponding user manuals.

10.2 Devices and accessories from Leica and 3rd party manufacturers

Recording Systems

- Evolution HD
- HDMD PRO

Camera Systems

- HD C100
- GLOW800

Monitors

- Sony 31" LMD-X310MT (4K)
- Sony 55" LMD-X550MT (4K)
- Sony 32" LM3251MT (3D)
- FSN 24" Monitor: FS-L24XXXX
- FSN 27" Monitor: FS-L27XXXX

Footswitches

- Wireless Footswitch, 14 functions
- Wireless Footswitch, 12 functions

Cart

- ITD for 31" and 55" Monitor

! See the corresponding instruction for use.

! Do not use third party products without premission of Leica.

10.3 Drapes

Supplier	Article No.	Main Front	Back assistant	Assistant left	Assistant right
Microtek	8033650EU 8033651EU 8033652EU 8033654EU	✓	✓	✓	✓
Pharma-Sept	9228H 9420H	✓	–	✓	✓
Fuji System	0823155	✓	–	✓	✓
	0823154	✓	✓	–	✓
Spiggle & Theis	2500130H	✓	–	✓	✓
Advance Medical	09-GL800	✓	–	✓	✓

! The use of the Leica Protective glass 10446058 is recommended.

11 Care and maintenance

11.1 Maintenance instructions

- Put a dust cover over the instrument while the brakes are in work.
- Keep accessories in a dust-free place when not in use.
- Remove dust with a pneumatic rubber pump and a soft brush.
- Clean the objectives and eyepieces with special optics cleaning cloths and pure alcohol.
- Protect the surgical microscope from damp, vapors, acids, alkalis, and corrosive substances.
  Do not keep chemicals near the instrument.
- Protect the surgical microscope from improper handling. Install other device sockets or unscrew optical systems and mechanical parts only when explicitly instructed to do so in this user manual.
- Protect the surgical microscope from oil and grease.
  Never oil or grease the guide surfaces or mechanical parts.
- Remove coarse debris with a moistened disposable cloth.
- To disinfect the surgical microscope, use compounds from the surface disinfectant group based on the following active ingredients:
  - aldehydes,
  - alcohols,
  - quaternary ammonium compounds.

Due to potential damage to the materials, never use products based on
- halogen-splitting compounds,
- strong organic acids,
- oxygen-splitting compounds.

► Follow the disinfectant manufacturer's instructions.

It is recommended to conclude a service contract with Leica Service.

11.2 Cleaning the touch panel

► Before cleaning the touch panel, switch off your ARveo and disconnect it from the power supply.
► Use a soft, lint-free cloth to clean the touch panel.
► Do not apply cleaning agent directly to the touch panel; rather, apply it to the cleaning cloth.
► Use a commercially available glass/eyeglass cleaner or plastic cleaner to clean the touch panel.
► Do not apply pressure to the touch panel while cleaning it.

It is recommended to conclude a service contract with Leica Service.

NOTE

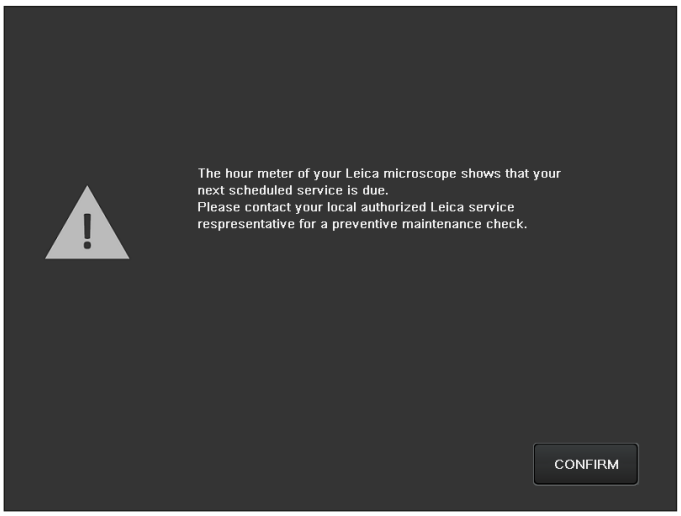
Damage to the touch panel.

► Operate the touch panel using your fingers only.
  Never use hard, sharp or pointy objects made out of wood, metal or plastic.
► Never clean the touch panel using cleaners that contain abrasive substances. These substances can scratch the surface and cause it to be become dull.

11.3 Maintenance

The ARveo surgical microscope generally requires no maintenance. To ensure that it always operates safely and reliably, we recommend that you take the precaution of contacting the responsible service organization.
You can arrange for periodic inspections or, if appropriate, conclude a maintenance contract with them.

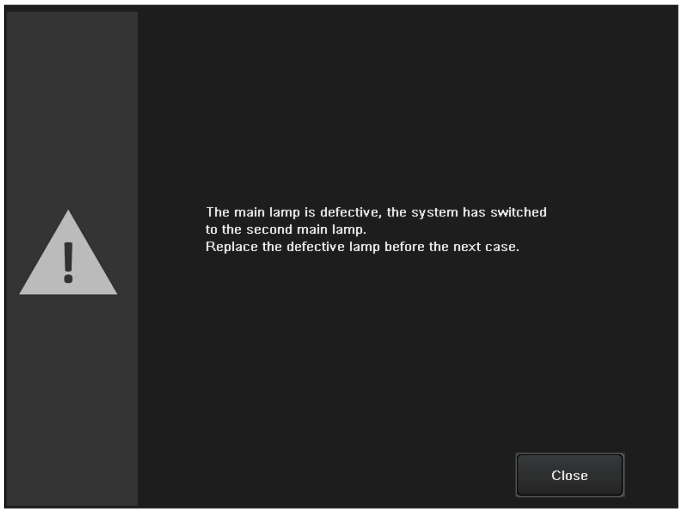
- It is recommended to conclude a service contract with Leica Service.
- Use only original spare parts for servicing.
- After 18 months you will be reminded that the inspection is due when you switch on the microscope.



► Press the "CONFIRM" button.
The dialog window is closed.

11.4 Changing bulbs

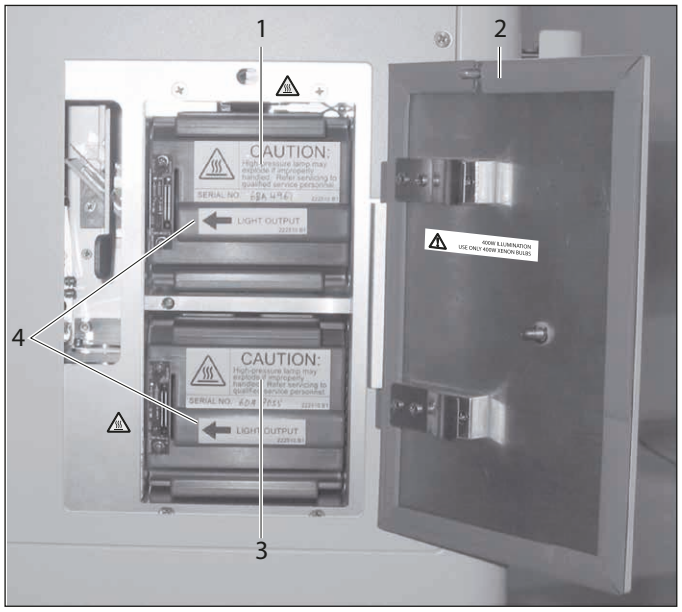
A dialog window opens when the lamp power drops below the recommend minimum level.



► Press the "Close" button.
The dialog window is closed.
► Replace the defective lamps.

Before replacing the lamp, disconnect the surgical microscope from the power supply.

► Open access door (2) for lamp insert.
The illumination push-button (item 2, page 7) flashes orange.



CAUTION

Danger of skin burns. The lamp insert gets very hot.

► Check that the cover has cooled before you replace the lamp.

► Remove the defective lamp insert (1 or 3) and install a new lamp insert (available from Leica Microsystems).

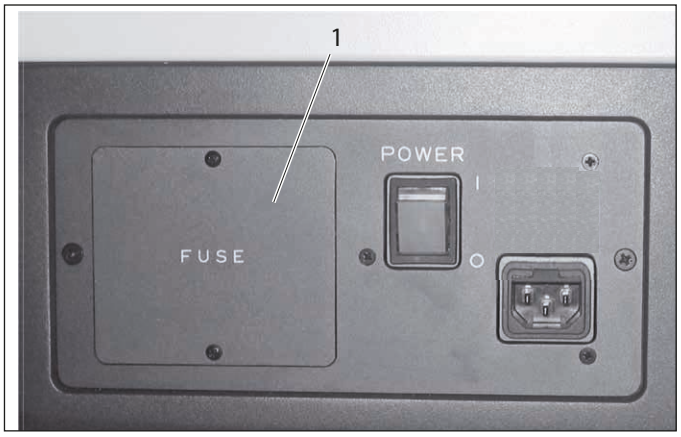
When installing the lamp insert, make sure that the arrow (4) is pointing to the left.

► Close the access door again.
The illumination push-button (item 2, section 6.2) lights up green.

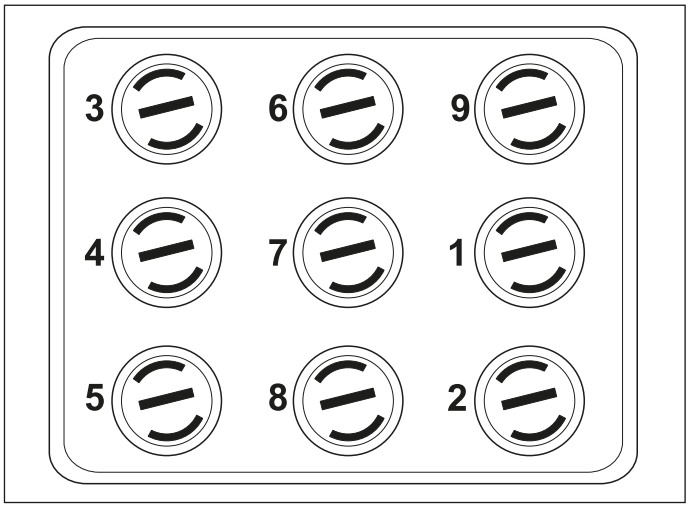
Whenever you replace a bulb, reset the bulb's hour meter to 0 by double-clicking the "Reset" button, see page 50.

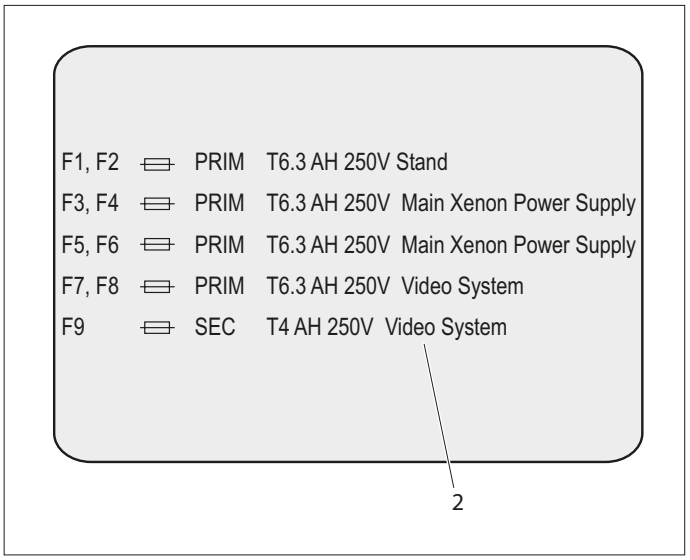
11.5 Changing fuses

► Remove the cover (1) with a screwdriver.



► Unscrew the fuse holders, remove the fuses and replace them with the fuse type specified in the table (2) on the back side of the cover (1).





11.6 Notes on reprocessing of resterilizable products

11.6.1 General

Products

Reusable products supplied by Leica Microsystems (Schweiz) AG such as rotary knobs, objective protective glasses and capping pieces.

Limitation of reprocessing

For the medical devices used on patients suffering from Creutzfeldt Jacob Disease (CJD) or suspected of having CJD or variant CJD, the local statutory requirements have to be met. Normally resterilizable products used on this group of patients are to be eliminated without risk by incineration.

Occupational safety and health protection

Particular attention must be paid to the occupational safety and health protection of the persons responsible for preparing contaminated products. Current regulations of hospital hygiene and prevention of infection must be observed in the preparation, cleaning and disinfection of the products.

Limitation of reprocessing

Frequent reprocessing has little effects on these products. The end of the product life cycle is usually determined by wear and tear and damage through use.

11.6.2 Instructions

Workplace

► Remove surface contamination with a disposable cloth/paper cloth.

Storage and transport

- No special requirements.
- It is recommended to perform the reprocessing of a product immediately following its use.

Preparation for cleaning

► Remove the product from the ARveo surgical microscope.

Cleaning: manually

- Equipment: running water, detergent, alcohols, microfiber cloth

Procedure

► Rinse surface contamination off of the product (temp. < 40 °C). Use some rinsing agent depending upon degree of contamination.
► Alcohol may also be used to clean the optics if heavy contamination such as fingerprints, grease streaks etc. is present.
► Dry off products, except for optical components, with a disposable cloth/paper cloth. Dry off optical surfaces with a micro-fiber cloth.

Cleaning: automatically

- Equipment: cleaning/disinfecting device

It is not recommended to clean products with optical components in a cleaning/disinfecting device. In addition, optical components must not be cleaned in ultrasonic baths in order to prevent damage.

Disinfection

The alcohol disinfection solution "Mikrozid. Liquid" may be used in accordance with the instructions on the label.
Please note that after disinfection, the optical surfaces must be rinsed thoroughly with fresh drinking water, followed by fresh demineralized water. The products must be dried thoroughly before the subsequent sterilization.

Maintenance

No special requirements.

Control and functional test

Check the snap-on behavior of rotary knobs and handles.

Packaging

Individual: A standard PE bag may be used. The bag must be large enough for the product so that the closure is not under tension.

Sterilization

See Sterilization table on page 59.

Storage

No special requirements.

Additional information

None

Contact information of manufacturer

Address of local agent

Leica Microsystems (Schweiz) AG verified that the aforementioned instructions for the preparation of a product are suitable for its reuse. The processing person is responsible for reprocessing with the equipment, materials and personnel and for achieving the desired results in the reprocessing installation. In general, this requires validations and routine monitoring of the process. Every deviation from the supplied instructions should also be examined carefully by the processing person to determine effectiveness and possible detrimental consequences.

11.6.3 Sterilization table

The following table gives an overview of the available sterilizable components to the surgical microscopes of Leica Microsystems (Schweiz) AG, Medical Division.

		Permissible sterilization methods			Products						
Article No.	**Designation**	**Steam autoclave 134 °C, t > 10 min.**	**Ethylene oxide max. 60 °C**	**STERRAD® 1)**	**M320**	**M220**	**M620**	**M844 M822 M820**	**M525**	**M530 ARveo**	**M720**
10180591	Clip-on handle	✓	–	✓	–	–	✓	✓	–	–	–
10428328	Rotary knob, binocular tubes T	✓	–	–	–	✓	–	✓	✓	✓	✓
10384656	Rotary knob, transparent	✓	–	✓	–	✓	✓	–	–	–	–
10443792	Lever extension	✓	–	–	–	–	✓	✓	–	–	–
10446058	Protective glass, multifocal lense	✓	✓	✓	–	–	–	–	✓	✓	–
10448439	Protective glass	✓	✓	–	–	–	–	✓	–	–	✓
10448440	Cover, sterilizable	✓	–	–	✓	–	–	–	–	–	–
10448431	Protective objective glass	✓	✓	✓	✓	–	–	–	–	–	–
10448296	Protective objective glass, spare part (package of 10)	✓	✓	–	–	–	–	✓	–	–	✓
10448280	Protective objective glass, complete, sterilizable	✓	✓	–	–	–	–	✓	–	–	✓
10731702	Cover, sterilizable	✓	–	✓	✓	–	–	✓	–	–	–

1) This medical device falls within the validated stertility claims of the STERRAD®100S / STERRAD® 100NX / STERRAD®50 / STERRAD®200 Systems. Follow the instructions for use of your STERRAD® System User's Guide prior to sterilizing devices in STERRAD® Systems.

12 Disposal

The respective applicable national laws must be observed for disposal of the products, with the involvement of corresponding disposal companies. The unit packaging is to be recycled.

13 What to do if ...?

If your instrument has a malfunction that is not described here, please contact your Leica representative.

13.1 Malfunctions

Malfunction	Cause	Remedy
The microscope tilts when you press the "All Brakes " button.	The arm system is not correctly balanced.	▶ Balance microscope carrier (see page 25).
The microscope cannot be moved or moved only with a great deal of effort.	A cable is sticking.	▶ Reroute affected cable.
Functions cannot be activated using the footswitch or the controls on the handles.	A cable connection has come loose.	▶ Check the footswitch connection.
	Incorrect assignment entered at control unit.	▶ Change the assignment using the control unit.
No light in the microscope.	The fiber optics cable has been disconnected.	▶ Check the connection of the fiber optics cable.
	Main illuminator and/or auxiliary illumination defective.	▶ Switch to the other illuminator (see page 37).
Light intensity below expectation	Fiber optics cable not in place properly	▶ Check connection of fiber optics cable
Back assistant / side assistants have no light	Selection of the assistants not correct	▶ Check selection of the assistants (see page 25)
Left / right side assistant has no light	Selection of the assistant not correct	▶ Check selection of the assistant (see page 25)
The image remains unfocused.	Eyepieces are not mounted correctly.	▶ Screw the eyepieces all the way on.
	Diopters not set correctly.	▶ Perform dioptric correction exactly according to the instructions (see page 24).
The microscope or arm system moves up/ down or rotates on its own accord.	Arm system is not correctly balanced.	▶ Balance out ARveo (see page 25).
	Cables are not correctly laid or have slipped out of position and exert force on the system (possibly additional video cable).	▶ Route cables according to installation guide and implement strain relief.
	ARveo was balanced in a locked state.	▶ Release the locking mechanism (see page 22) and balance the ARveo (see page 25).
The microscope and microscope carrier can be moved only with difficulty or not at all.	Automatic balancing has not been completed.	▶ Make sure that position B has been assumed (see page 28). ▶ Press the push-button for auto-balance again.
Automatic balancing cannot be performed.	Microscope is tilted at too great an angle.	▶ Align the A/B-axes on the microscope parallel carried out to each other (see page 28). ▶ Carry out automatic balancing again.
Magnification cannot be adjusted electrically.	Failure of magnification motor.	▶ Set the magnification by turning the magnification rotary knob (see page 39).
No XY movements possible at one of the two handles.	No XY movements configured for the handles in the control unit.	▶ Set the joystick to XY movement (see page 48).

Malfunction	Cause	Remedy
The microscope has not been balanced exactly in the B axis.	Installed accessory was not turned back to the working position when balancing the B axis.	▶ Rebalance the B axis. ▶ Make sure that the accessory is turned back to the working position when balancing the B axis (see page 28). ▶ Perform intraoperative B/C balancing (see page 28).
Push button for automatic balancing flashes, but acoustic signal does not sound (nothing happens).	Balancing process is not yet completed.	▶ Rotate the microscope to the B-position and press the Autoblance push-button.
The stand of the ARveo moves.	Footbrakes not applied.	▶ Fix footbrakes in place (see page 22).
The range of movement of the ARveo is limited (swing, tilt, rotate, XY movement).	Cable laid too tightly.	▶ Re-lay the cable (see assembly instructions ARveo).
	Video camera was not correctly mounted and touches the arm system.	▶ Properly install the video camera.
ARveo is not correctly balanced.	Position of accessory was changed after balancing.	▶ Balance out ARveo (see page 25).
		▶ Perform intraoperative AC/BC balancing (see page 28).
ARveo cannot be balanced.	The weight disk which you are using on the D axis cannot balance the installed accessories.	▶ Replace or add counterweight on the D axis (see page 30).
	ARveo was balanced in the transport position.	▶ Take the ARveo out of transport position and rebalance it.
Iris does not follow magnification	AutoIris in override mode	▶ Press the AutoIris reset button.
Working distance does not move	Working distance emergency drive blocked by drape	▶ Release working distance emergency drive.
Working distance on microscope cannot be adjusted.	Leica SpeedSpot® activated.	▶ Check Leica SpeedSpot® settings (see page 49). Exception: You are working with a laser micromanipulator on which this function has been programmed for safety reasons.
The image appears shaded through the microscope at the edges and the illumination field is outside the field of vision.	Accessories not installed exactly.	▶ Install the accessories exactly in the holders (see page 23).

13.2 Malfunctions documentation accessories

Malfunction	Cause	Remedy
Video pictures unfocussed.	Microscope or Video Adapter not precisely focussed.	▶ Focus precisely, use graticule if necessary. ▶ Perform diopter correction exactly according to the instructions.

13.3 Error messages on the control unit

When the control unit detects an error, the yellow "Check" button lights up.

▶ Press the "Check" button.
The list with error messages is displayed.

▶ To acknowledge a message, select the message and press the "Confirm" button.
When there is no error message pending, the yellow "Check" button disappears.

Message	Cause	Remedy
"Check lamp 1/2"	Lamp 1/2 is defective.	▶ After the operation of the defective lamp 1/2, check and replace.
"Lamp 1/2 not sufficient for blue light (FL400)"	Lamp 1/2 is loosing luminosity	▶ Replace lamp 1/2
"Lamp 1/2 not sufficient for white light"	Lamp 1/2 is loosing luminosity	▶ Replace lamp 1/2
"Device not available"	The connecting cable has been disconnected or is defective.	▶ Check corresponding connection cable for proper seating and function. ▶ Contact your Leica representative.
"No connection to Docu System"	The connecting cable has been disconnected or is defective.	▶ Check corresponding connection cable for proper seating and function. ▶ Contact your Leica representative.
"Rear load too high!"	The accessories being used cannot be balanced.	▶ Reduce the load on the rear side of the optics carrier.
"Front load too high!"	The accessories being used cannot be balanced.	▶ Reduce the load on the front side of the optics carrier.
"Left hand side load to high!"	The accessories being used cannot be balanced.	▶ Reduce the load on the left side of the optics carrier.
"Right hand side load to high!"	The accessories being used cannot be balanced.	▶ Reduce the load on the right side of the optics carrier.
"Too many counterweights at D axis"	The counterweights used on the D axis cannot balance out the installed accessories.	▶ Replace the counterweight on the D axis (see page 30).
"Too less counterweights at D axis"	The counterweights used on the D axis cannot balance out the installed accessories.	▶ Replace the counterweight on the D axis (see page 30).
"Illumination unit not closed"	The access door of the illumination unit is not closed. The push button for Illumination on/off flashes.	▶ Close the access door of the illumination unit and lock it using the turn knob.
"Luxmeter is defective"		▶ Contact your Leica representative.
"Microscope device controller not available"		▶ Contact your Leica representative.

14 Specifications

14.1 Electrical data

Power connection for ARveo	1200VA 100V - 240V 50 - 60 Hz
Protection class	Class 1

14.2 ARveo

14.2.1 Microscope features

Magnification	6:1 zoom, motorized, manual adjustment option, status displayed in the display of the optics carrier
Objective / working distance	225-600 mm, motorized multifocal lens, continuously adjustable, manual adjustment option, status displayed in the display of the optics carrier
Eyepieces	Wide-field eyepieces for persons wearing glasses 8.3×, 10× and 12.5× dioptric adjustment ±5 diopter settings; adjustable eyecup
Illumination	Illumination system specially developed for microsurgical applications; Continuously variable illumination field diameter with Gaussian light distribution. Continuously adjustable brightness at constant color temperature
AutoIris	Built-in automatic zoom-synchronized illumination field diameter, with manual override and reset feature
Main illuminator	High-output xenon lamp 400 W, via fiber optics cable
Emergency lamp	400 W xenon arc-lamp with redundant electrical high voltage part
BrightCare Plus	Safety function through working distance-dependent limitation of the brightness, controlled by a built-in luxmeter
SpeedSpot	Laser focussing aid for fast and exact positioning of the microscope Laser Class 2 Wave length 635 nm Optical power <1 mW
Fine focus	Available for back assistant
Magnification multiplier	1.4× (optional)
IR sensor	For remote control of the Leica HD C100

14.2.2 Optical data

Zoom magnification

Binocular tubes type A (focal length f162.66)		Working distance			
		225 mm		600 mm	
		M_{tot}	FoV [mm]	M_{tot}	FoV [mm]
Eyepiece 8.3×	min.	1.60	114.5	0.80	230.4
	max.	9.6	19.1	4.8	38.4
Eyepiece 10×	min.	1.92	109.3	0.96	219.9
	max.	11.5	18.2	5.7	36.7
Eyepiece 12.5×	min.	2.40	88.5	1.19	178.0
	max.	14.4	14.7	7.2	29.7

Binocular tubes type B (focal length f170.0)		Working distance			
		225 mm		600 mm	
		M_{tot}	FoV [mm]	M_{tot}	FoV [mm]
Eyepiece 8.3×	min.	1.68	109.4	0.83	220.2
	max.	10.1	18.2	5.0	36.7
Eyepiece 10×	min.	2.01	104.4	1.0	210.2
	max.	12.1	17.4	6.0	35.0
Eyepiece 12.5×	min.	2.51	84.5	1.25	170.1
	max.	15.1	14.1	7.5	28.35

M_{tot} Total magnification
FoV Field of View

The values above contain a tolerance of ±5 %

Zoom magnification including magnification multiplier 1.4×

Binocular tubes type A (focal length f162.66)		Working distance			
		225 mm		600 mm	
		M_{tot}	FoV [mm]	M_{tot}	FoV [mm]
Eyepiece 8.3×	min.	2.24	81.8	1.12	164.5
	max.	13.4	13.6	6.7	27.4
Eyepiece 10×	min.	2.7	78.1	1.34	157.1
	max.	16.1	13.0	8.0	26.2
Eyepiece 12.5×	min.	3.36	63.2	1.67	127.2
	max.	20.2	10.5	10.0	21.2

Binocular tubes type B (focal length f170.0)		Working distance			
		225 mm		600 mm	
		M_{tot}	FoV [mm]	M_{tot}	FoV [mm]
Eyepiece 8.3×	min.	2.35	78.1	1.16	157.3
	max.	14.1	13.0	7.0	26.2
Eyepiece 10×	min.	2.8	74.6	1.4	150.1
	max.	16.9	12.4	8.4	25.0
Eyepiece 12.5×	min.	3.5	60.4	1.75	121.5
	max.	21.1	10.1	10.5	20.3

M_{tot} Total magnification
FoV Field of View

The values above contain a tolerance of ±5 %

Binocular tubes

Binocular tube	Focal length	Art. No
Type A	**f162.66**	10447701*, 10446575*, 10448088, 10446574, 10446587, 10446618
Type B	**f170.0**	10446797, 10448159*, 10448217*

* not recommended

14.2.3 Microscope carrier

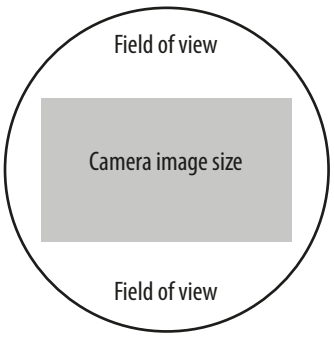
Rotation of optics	540°
Lateral tilt	50° to left / 50° to right
Inclination tilt	–30° / +120°
XY speed	Zoom linked XY speed
Balancing	A, B, C and D axes fully automatic, each can be corrected manually
Brakes	1 brake for A/B axis 1 brake for C axis
Indicator	LED for Fluorescence mode status LED for Video record status

Leica M530 with ULT530

Integrated camera for visible light	Leica HD C100 built in 1/2.8" CMOS (optional)
FusionOptics	for increased depth of field for main surgeon and back assistant
Manual fine focus	for back assistant, ±5 Dpt
Integrated 360° rotatable adapter	for main surgeon and back assistant binocular
Light distribution	37 % for main surgeon, assistants switchable; either 23 % for side assistant or 10 % for back assistant
Usage	CaptiView to be mounted between Leica M530 and ULT530

Camera image size with respect to the field of view

- Camera for visible light



The figure shows the camera image size with respect to the field of view for the visual video camera. Please be aware that the field of view is not fully covered by the documentation system.

14.2.4 IGS

Interface/ Compatibility	Open architecture for IGS systems Please ask your Leica representative.

14.2.5 Lasers

Interface/ Compatibility	Open architecture for laser systems Please ask your Leica representative.

14.2.6 Floor stand

Type	Floor stand with 6 electromagnetic brakes
Base	720 × 720 mm with four 360° rotating castors with a diameter of 130 mm each, one parking brake
Balancing	New "no brake release" Auto-Balance: One button/two push for complete automatic balancing of stand and optics
Intraoperative balancing	Automatic intraoperative AC/BC balancing of AC and BC axes
Microscope carrier	"Advanced Movement" system for perfect balancing in six axes, new vibration damping technology
Floor stand control unit	New generation touch panel technology. The latest electronics control for the continuous governing of all motor functions and the light intensity. Data shown by means of LCD. Built-in BrightCare Plus safety function for limiting brightness depending on working distance. ISUS Intelligent Setup System. Menu selection based on unique software for user-specific configuration, with built-in electronic auto-diagnosis and user support.
Control unit stand	Software independent hard keys for illumination and auto-balancing. Indicator for Main/backup illumination and Fluorescence modes. Open architecture for future software developments.
Light source	Dual Xenon arc-lamp illumination system and built in automatic lamp quick changer.
Control elements	Pistol handle with 10 functions for magnification, working distance, "All Brakes" button releases 6 brakes, side knob releases selected brake combinations, motorized side tilt (XY). All buttons except "All Brakes" are freely assignable. Mouthswitch for releasing the selected brake combination. 12-function footswitch and handswitch.
Integrated documentation	Prepared for integration of video camera system and digital recording system. Open architecture
Connectors	Numerous built-in connectors for Video, IGS and control data transfer. Internal power supply 12 VDC, 19 VDC and AC terminals
Carrier for monitor	700 mm long and flexible arm with 4 axis for rotation and inclination to carry optional video monitor
Materials	All solid metal construction
Surface coating system	Coated with antimicrobial paint
Minimum height	In park position: 1945 mm
Range Cantilever	Max. 1925 mm
Load	Monitor arm: max. 16kg Swing arm: min. 6.7 kg, max. 12.2 kg from microscope dovetail ring interface
Weight	350kg total weight of stand inkl. max. load

14.3 Ambient conditions

In use	+10 °C to +40 °C +50 °F to +104 °F 30 % to 95 % rel. humidity 800 mbar to 1060 mbar atmospheric pressure
Storage	−40 °C to +70 °C −40°F to +158 °F 10 % to 100 % rel. humidity 500 mbar to 1060 mbar atmospheric pressure
Transport	−40 °C to +70 °C −40 °F to +158 °F 10 % to 100 % rel. humidity 500 mbar to 1060 mbar atmospheric pressure

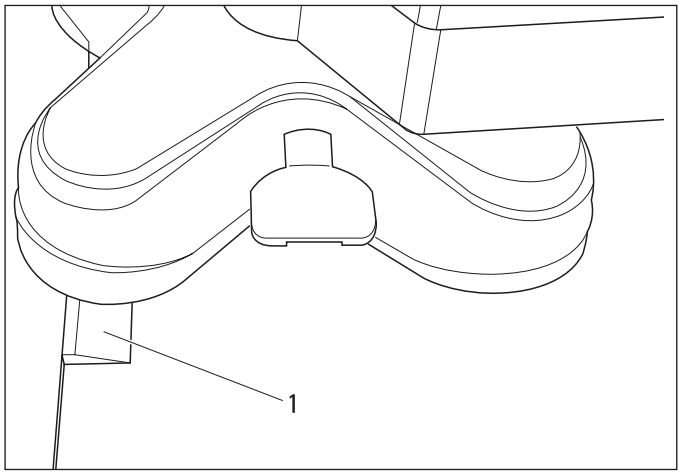
14.4 Standards fulfilled

CE conformity

- Medical Devices Directive 93/42/EEC including amendments.
- Classification: Class I, in compliance with Annex IX, Rule 1 and Rule 12 of the Medical Devices Directive.
- Medical electrical equipment, Part 1: Generally defined for the security in IEC 60601-1; EN 60601-1; UL 60601-1; CAN/CSA-C22.2 NO. 601.1-M90.
- Electromagnetic compatibility IEC 60601-1-2; EN 60601-1-2; EN 61000-3-2; IEC 61000-3-2.
- Further applied harmonized standards: IEC 62366, IEC60825-1, EN60825, IEC 62471, EN62471, EN 980.
- The Medical Division, within Leica Microsystems (Schweiz) AG, hold the management system certificates for the international standard ISO 13485 relating to quality management, quality assurance and environmental management.

14.5 Limitations of use

The ARveo may be used only in closed rooms and must be placed on a solid floor.
The ARveo is not suitable for crossing thresholds higher than 20 mm.
To move the surgical microscope over thresholds of 20 mm, the wedge (1) included in the packaging can be used.

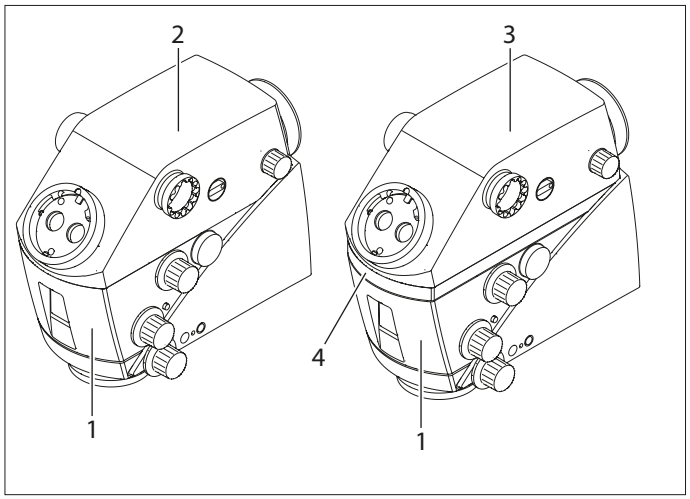


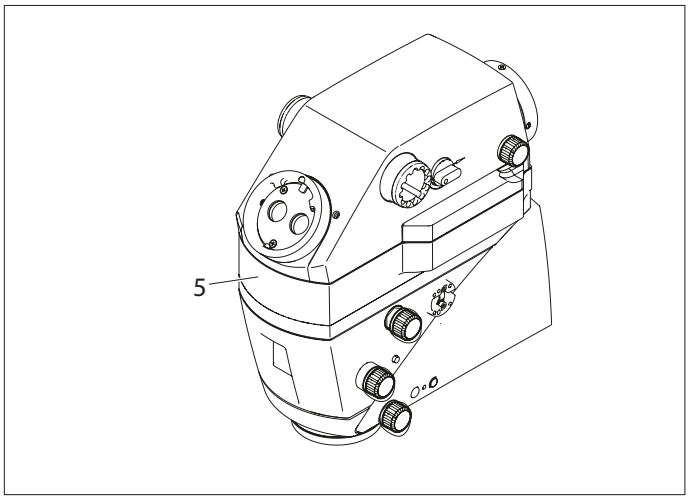
- ► Place the wedge (1) in front of the threshold.
- ► Move the surgical microscope across the threshold in transport position, pushing it by the handgrip.

Without auxiliary equipment, the ARveo can be moved across thresholds up to a max. height of 5 mm.

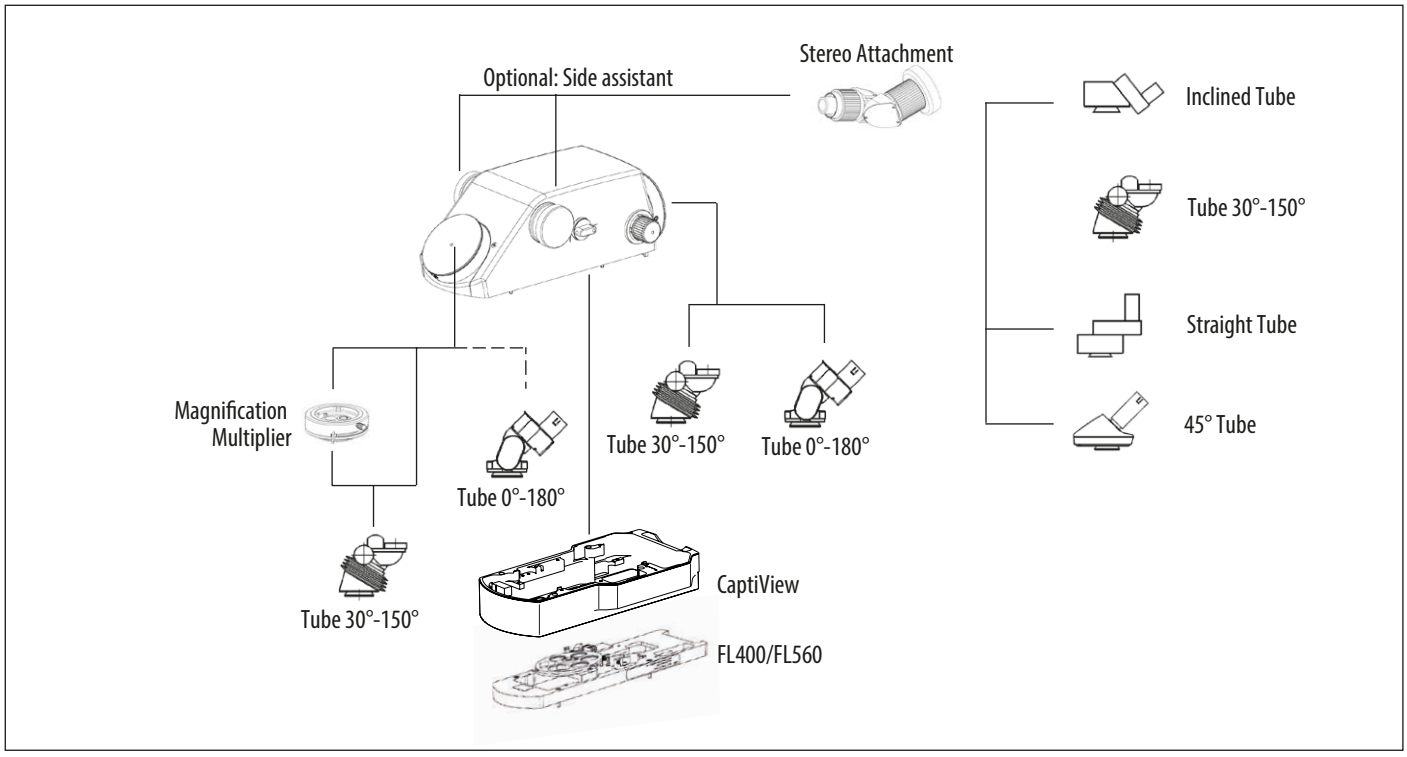
14.6 List of weights of balanceable configurations

14.6.1 Leica M530 Optics Carrier





1 Leica M530 Optics carrier
2 Leica ULT530 or GLOW800 or Leica FL800 ULT
3 Leica ULT530 or GLOW800 or Leica FL800 ULT
4 Leica FL400/FL560
5 CaptiView



Equipment of ARveo Serial No. ..... **Max. load from microscope dovetail ring interface: 12.2 kg**

Equipment of Leica M530 with ULT530					Installation	
Art. No.		**Description**	**Comment / Restrictions**	**Weight**	**#**	**Total**
10448704	**M**	**Leica M530 Optics carrier**		3.5 kg		.
10448770	S	Leica FL400 for M530		0.48 kg		
10448775	S	Leica FL560 for M530		0.48 kg		
10448776	S	Leica FL400 for M530/Leica FL560 for M530		0.50 kg		
	M	**CaptiView**		1.20 kg		.
	M	**Interface to ULT530**				.
10449022	S	ULT530		1.64 kg		.
10448962	S	GLOW800		1.9 kg		.
10449023	S	Leica FL800 ULT		1.76kg		
	M	**Binocular tube for main surgeon**	Maybe the orientation of the tubes must be adapted to balance the system.			.
10446797	S	Binocular tube var. 30°-150° T, Type II L	Recommended	0.81 kg		.
10448088	S	Binocular tube var. 0°-180° T, Type II	Not recommended (vignetting)	1.42 kg		.
	M	**Binocular tube for back assistant**				.
10446797	S	Binocular tube var. 30°-150° T, Type II L	Recommended	0.81 kg		.
10448088	S	Binocular tube var. 0°-180° T, Type II		1.42 kg		.
	O	**Side observation**	0, 1 or 2 side assistants			.
10448597	S	Stereo attachment		1.01 kg		.
	M	**Binocular tube on Stereo attachment**	If Stereo attachment is selected			.
10446797	S	Binocular tube var. 30°-150° T, Type II L	Recommended	0.81 kg		.
10446587	S	Straight binocular tube T, Type II				.
10446618	S	Inclined binocular tube 45°, Type II		0.56 kg		.
10446574	S	Inclined binocular tube T, Type II		0.74 kg		.
10448668	O	Magnification multiplier	Only 1 piece, only main surgeon and only with binocular tube 30°-150° (vignetting)	0.28 kg		.
10449018	O	Leica HD C100	with external Power Supply (PIZOL)			
10449017	O	Leica HD C100	without external Power Supply (PIZOL)			
M = Must, O = Option, S = Selection			continued on next page		**Load**	.

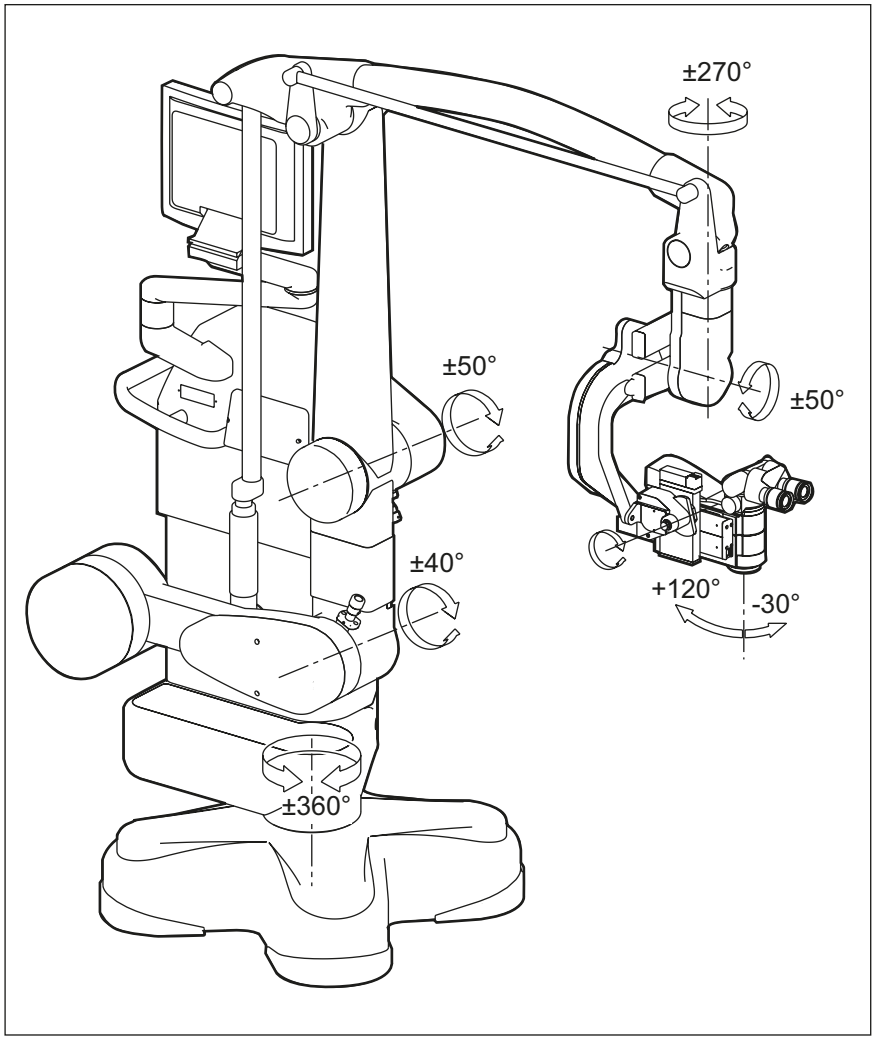
Equipment of Leica M530 with ULT530					Installation	
Art. No.		**Description**	**Comment / Restrictions**	**Weight**	**#**	**Total**
10448079	O	Universal laser adapter				.
	O	Laser micro manipulator				.
	O	Laser filter	0-4 pieces, (main, back, sides)			.
10448028	O	Eyepiece 10x	2 eyepieces per binocular tube	0.10 kg		.
10448125	O	Eyepiece 8.3x		0.10 kg		.
10443739	O	Eyepiece 12.5x		0.10 kg		.
10448245	O	Mouth switch		0.22 kg		.
10446058	O	Protective glass		0.02 kg		.
	O	IGS Frame				.
Load from previous page						.
M = Must, O = Option, S = Selection					**Total Load**	.

NOTE

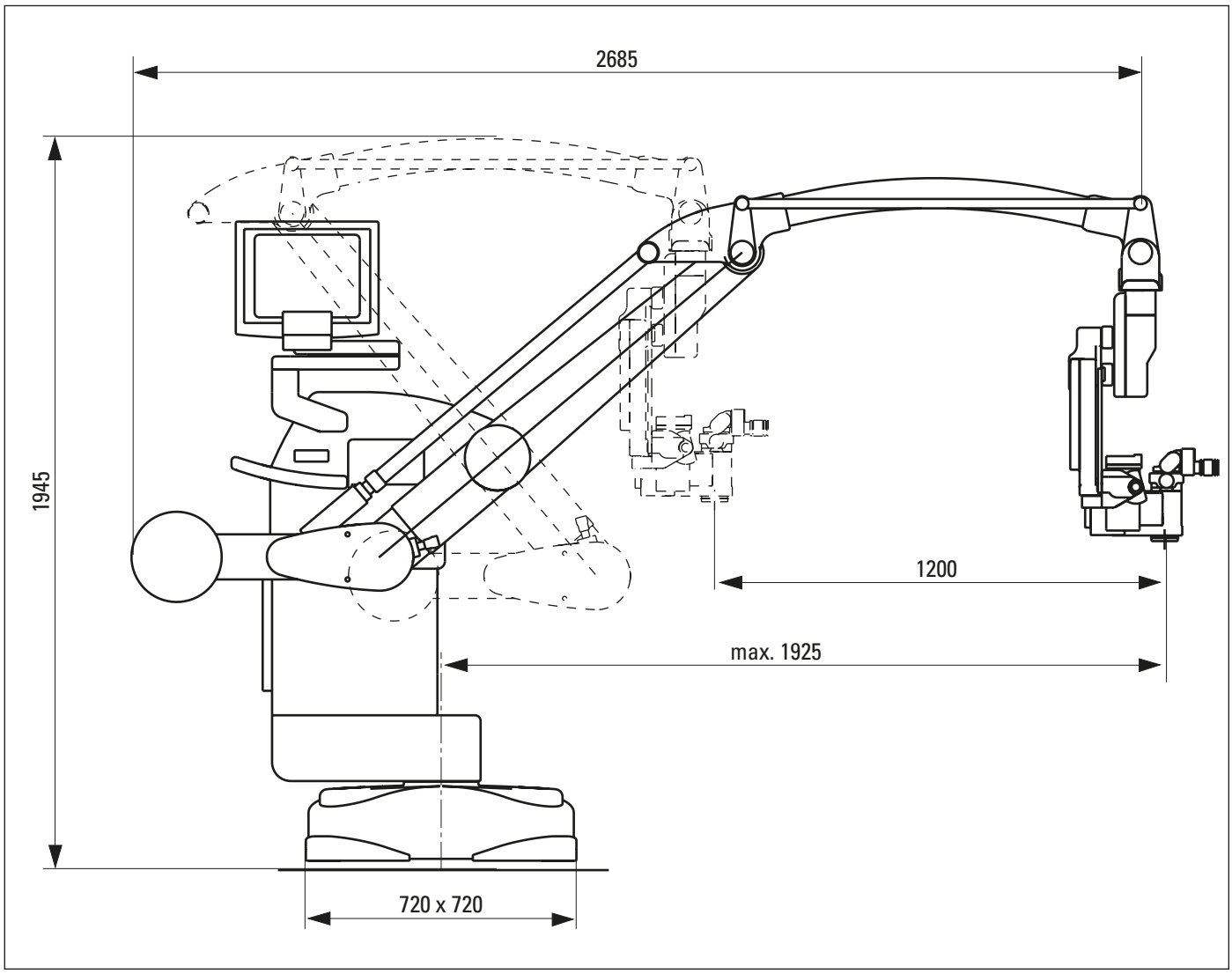
Destruction of the ULT530 optics.

- ► Do not use any video adapter in combination with the Leica M530 with ULT530 and CaptiView or GLOW800.

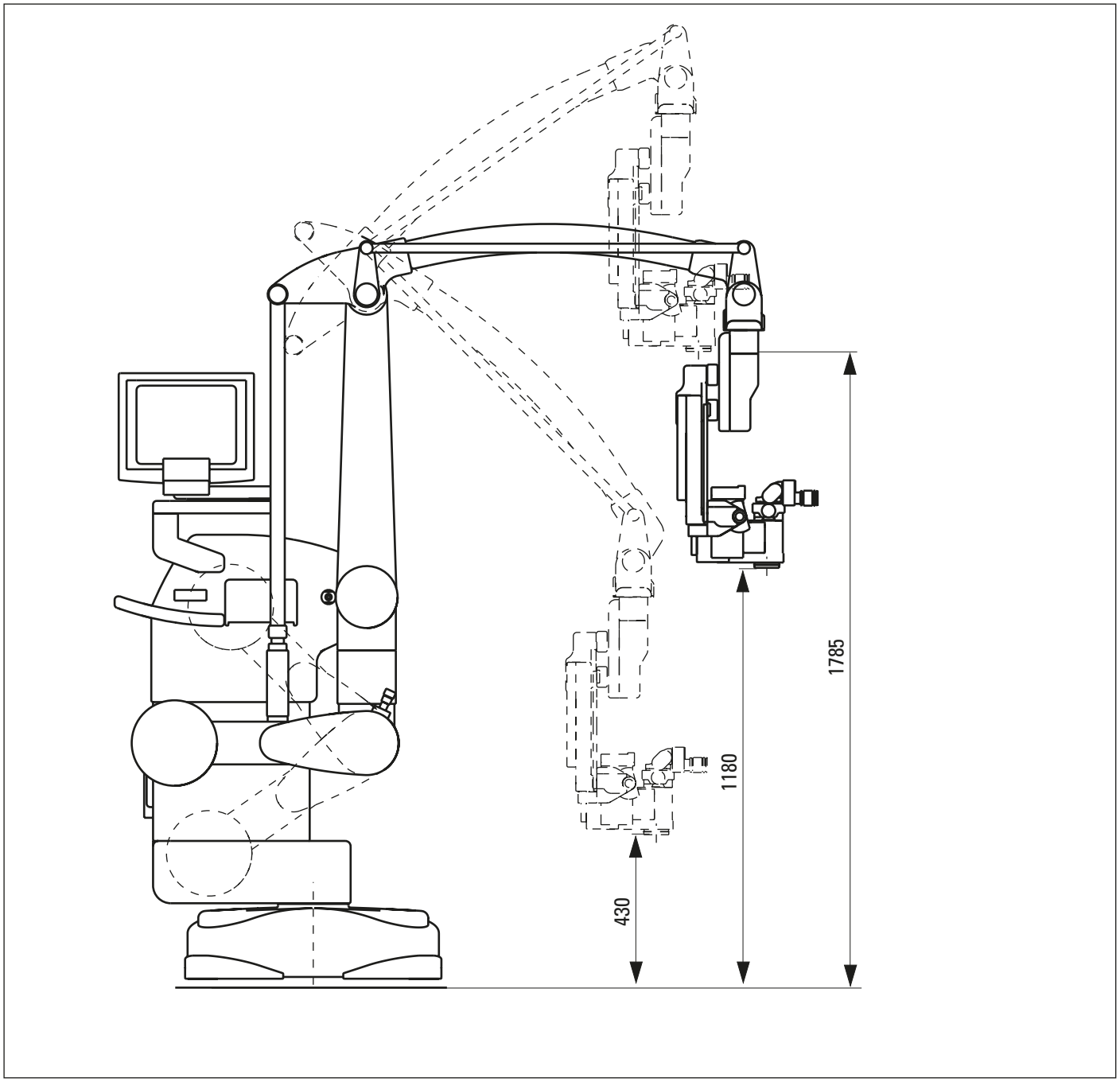
14.7 Dimensional drawings



Dimensions in mm



Dimensions in mm


1785
1180
430

15 Manufacturer's declaration of electromagnetic compatibility (EMC)

The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

This "Guidance and manufacturer's declaration" document is based on EN 60601-1-2.

15.1 Table 1 from EN 60601-1-2

Guidance and manufacturer's declaration – electromagnetic emissions

The ARveo surgical microscope is intended for operation in an environment as specified below.
The customer or the user of the ARveo surgical microscope should make sure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions in accordance with CISPR 11	Group 1	The ARveo surgical microscope uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Conducted emissions in accordance with CISPR 11	Class A	The ARveo is suitable for use in establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for residential purposes.
Harmonic emissions according to IEC 61000-3-2	Class A	
Emission of voltage fluctuations/flicker according to IEC 61000-3-3	Complies	

15.2 Table 2 from EN 60601-1-2

Guidance and manufacturer's declaration – electromagnetic immunity

The ARveo surgical microscope is intended for operation in an environment as specified below.
The customer or the user of the ARveo surgical microscope should make sure that it is used in such an environment.

When the ARveo surgical microscope is exposed to any of the disturbances below, you might notice one of the following effects:
- flickering/noise on the HD Monitor
- interruptions on the HD Montior

Non of the listed effects above have an impact on the essential performance or safety and effectiveness of the ARveo surgical microscope. Its no unacceptable risk for User, Patient or environment to be expected.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Discharge of static electricity (ESD) according to IEC 61000-4-2	± 8 kV contact discharge ± 15 kV air discharge	± 8 kV contact discharge ± 15 kV air discharge	Floors should be of wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/ burst immunity according to IEC 61000-4-4	± 2 kV for power supply line ± 1 kV for input and output lines	± 2 kV for power supply line ± 1 kV for input and output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surges according to IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and power supply voltage fluctuations IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for ½ cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	70% U_T 25/30 cycles 40% U_T 10/12 cycles 40% U_T 5/6 cycles 0% U_T 0.5/0.5 cycles 0% U_T 1/1 cycles 0% U_T 250/300 cycles	Mains power quality should be that of a typical commercial or hospital environment. When short interruptions of 5 % U_T for 5 seconds occur, the ARveo surgical microscope will cease operation and restart automatically. It can be brought back to the state it was before with user intervention. If the user of the ARveo surgical microscope requires that the instrument remain functional even after power interruptions, it is recommended that the ARveo surgical microscope be provided with an auxiliary power source such as an uninterruptible power supply (UPS) or battery back-up.
Magnetic fields at mains frequency (50/60 Hz) according to IEC 61000-4-8	3 A/m	30 A/m	
Note	U_T is the AC voltage prior to application of the test level.		

15.3 Table 4 from EN 60601-1-2

Recommend separation distances between portable and mobile RF telecommunications equipment and the ARveo surgical microscope

The ARveo surgical microscope is intended for operation in an electromagnetic environment in which radiated RF interference is controlled. The customer or user of the ARveo surgical microscope can help prevent electromagnetic interference by maintaining the minimum distance between portable/mobile RF communication equipment (transmitters) and the ARveo surgical microscope, depending on the output power of the communication equipment, as stated below.

	Separation distance according to frequency of transmitter in m		
Rated maximum output power of transmitter in W	**150 kHz up to 80 MHz** $d = 2.4 \sqrt{P}$ in m	**80 MHz up to 800 MHz** $d = 2.4 \sqrt{P}$ in m	**800 MHz up to 2.5 GHz** $d = 2.4 \sqrt{P}$ in m
0.01	0.24	0.24	0.24
0.1	0.8	0.8	0.8
1	2.4	2.4	2.4
10	8.0	8.0	8.0
100	24.0	24.0	24.0

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

! If use is made of accessories or cables other than those specified in this user manual or approved by the manufacturer of the ARveo surgical microscope, this can lead to an increase in electromagnetic radiation or a reduction in EMC.

! The ARveo surgical microscope must not be used directly adjacent other instruments. If it is necessary to operate it in the vicinity of other instruments, the devices should be monitored to ensure that they function properly in this arrangement.

16 Annex

16.1 Checklist before the operation

Patient .....

Surgeon .....

Date .....

Step	Procedure	Details	Checked / Signature
1	Cleaning the optical accessories	▶ Check the tubes, eyepieces and the documentation accessories (if used) for cleanliness. ▶ Remove dust and dirt.	
2	Installing the accessories	▶ Position the handles as desired. ▶ Connect the mouth switch and/or footswitch if used. ▶ Check the camera image on the monitor and realign if necessary.	
3	Checking the tube settings	▶ Check the tube and eyepiece setting for the selected user.	
4	Balancing	▶ Balance the ARveo (see page 25). ▶ Press the "All Brakes" button on the handle and check the balancing.	
5	Function check	▶ Check the fiber optics cable connection to the optics carrier. ▶ Connect the power cable. ▶ Switch on the microscope. ▶ Switch on the illuminator at the control unit. ▶ Leave the illumination on for at least 5 minutes. ▶ Check the lamp history and make sure that the remaining life time is sufficient for the planned surgery. ▶ Replace defective bulbs before the surgery. ▶ Test all functions on the handles and the footswitch. ▶ Check the user settings on the control unit for the selected user.	
6	Safety check	▶ Check counterweights and accessories for secure seating.	
7	Positioning at the OP table	▶ Position the ARveo on the OP table as required and lock the foot brake (see page 31).	
8	Sterility	▶ Fit sterile components and sterile drape if used (see page 32).	
9	Final work	▶ Check that all equipment is in its proper position (all covers fitted, doors closed).	

Leica Microsystems (Schweiz) AG · Max Schmidheiny Strasse 201 · CH-9435 Heerbrugg

T +41 71 726 3333 · F +41 71 726 3399

www.leica-microsystems.com